KERN & Sohn GmbH

Operating instructions
Electronic Moisture Analyser

KERN DLT

Version 1.1
04/2013
GB

DLT-BA-e-1311

GB

KERN DLT

Version 1.1 04/2013

Operating instructions

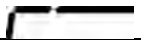
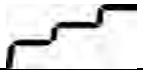
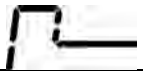
Electronic Moisture Analyser

English

Contents

English

1 Technical data

Data	DLT 100-3	
Radiator	Halogen (1 x 400 W)	
Temperature range	35°C - 160°C Choice of steps at 1°C	
Maximum load (Max)	160 g	
Warm-up time	2 h	
Minimum for drying	0.5 g	
Readability (d)	Weighing mode	0.001g
	Moisture analysis mode	0,01 %
Reproducibility	Weighing mode	0.001g
	Moisture analysis mode	Weighed in quantity 10 g: 0.03 %
Preheating before determining initial weigh	✓	
Linearity	± 0.002 g	
Stabilization time (typical)	3 sec.	
Recommended adjustment weight, not added (class)	100g (E2)	
Environmental conditions	• 5°C….+35°C ambient temperature • 45% - 75% air humidity non-condensing	
Drying modes	Standard drying 	
	Step-by-step drying 	
	Forced drying 	
	Gentle drying 	

English

Shutoff criterion	• **Manual** Press Stop key
	• **Time** Drying is finished after the set time, adjustable 1 – 99 minutes.
	• **Autostop %** If the set loss of weight (%) per unit of time drops below the desired value (both values adjustable)
	• **Auto stop absolute** If the set loss of weight (mg) per unit of time drops below the desired value (both values adjustable)
Result display	[g] residual weight [% M] moisture [% R] dry matter [% A] ATRO
Database for drying programs	300 positions
Interface	RS 232C
Dimensions (B x D x H)	Housing 210 x 340 x 225 mm
Available drying room	Ø 100 mm, 20 mm high
Sample dishes included	Ø 100 mm
Net weight	5.5 kg
Electric Supply	220 – 240 V AC 50/60 Hz
Mains adapter	5 V DC, 4A, 25 W

2 Instrument overview

The instrument consists of a terminal and a drying unit (integrated weighing scale + heating module).

Drying unit

Pos.	Description
1	Sample chamber
2	Halogen lamp
3	Temperature sensor
4	Sample dish
5	Heating module
6	Balance
7	Buttons
8	Levelling screw
9	Terminal

3 Basic instructions

3.1 Proper use

The instrument purchased by you is designed for a fast and reliable determination of material moisture in liquid, porous and solid materials by applying the method of thermogravimetrics.

3.2 Improper Use

Impacts and overloading exceeding the stated maximum load (max) of the instrument, minus a possibly existing tare load, must be strictly avoided.
Balance may be damage by this.
Do not operate the instrument in rooms subject to explosion hazard. The serial version is not explosion protected.
The structure of the balance may not be modified. This may lead to incorrect weighing results, safety-related faults and destruction of the moisture analyser.
The moisture analyser may only be used according to the described conditions. Other areas of use must be released by KERN in writing.

3.3 Warranty

Loss of warranty due to

- Our conditions in the operation manual are ignored
- The appliance is used outside the described uses
- Modifications to or opening of instrument
- Mechanical damage and damage caused by media, liquids
- Natural wear and tear
- The appliance is improperly set up or incorrectly electrically connected
- The measuring system is overloaded

3.4 Monitoring of Test Resources

In the framework of quality assurance the measuring-related properties of the moisture analyser and, if applicable, the testing weight, must be checked regularly. The responsible user must define a suitable interval as well as type and scope of this test. Information is available on KERN's home page (www.kern-sohn.com) with regard to the monitoring of balance test substances and the test weights required for this. In KERN's accredited DKD calibration laboratory test weights and balances may be calibrated (return to the national standard) fast and at moderate cost.

4 Basic Safety Precautions

4.1 Pay attention to the instructions in the Operation Manual

⇨ Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN balances.

⇨ Versions in other languages are non-binding translations. The only binding version is the original document in German.

4.2 Personnel training

The instrument may only be operated and maintained by trained personnel.

4.3 Danger Information

⚠ WARNING

⚠ The moisture analyser is used to analyse the moisture content of materials. This instrument must be used exclusively for this purpose. Any other usage may cause a risk to personnel, damage to the instrument or other material damage.

⚠ The moisture analyser should be used mainly for the drying of aqueous substances.

⚠ The moisture analyser may not be used in a hazardous area.

⚠ The appliance may only be operated and maintained by trained personnel.

⚠ Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN instruments.

⚠ Hazards during and after measuring

⚠ Ensure correct installation of all components, see chap. 5.3

⚠ Careful when removing the sample. The sample itself, the sample dish and the heating unit may be very hot.

⚠ Use the sample retainer at all times as it allows safe working and prevents burns.

⚠ Individual parts of the case (e. g. the ventilation grids) may heat up considerably during operation. Therefore, only take hold of the instrument by the marked handles.

English

CAUTION
The moisture meter works with heat!

☞ Maintain sufficient space in the environment of the instrument to prevent heat build-up (distance from the instrument 20cm, upwards 1m).

☞ Do not cover, plug, glue up or make any other changes to the heat vent of the sample.

☞ Never place combustible materials on, under or next to the instrument, as the environment of the instrument heats up to a high temperature.

☞ Careful when removing the sample. The sample itself, the sample dish and the heating unit may be very hot.

CAUTION
Fire or explosion

☞ Explosive, easily flammable samples and samples that go into a chemical reaction when subjected to heat, may not be analysed with the moisture analyser. Sample materials developing aggressive vapours (e. g. acids) may cause corrosion problems on some parts of the instrument.

☞ If in doubt, carry out a risk analysis.

☞ For samples of that kind choose a drying temperature that is low enough to prevent inflammation or explosion.

☞ Wear safety goggles.

WARNING
Substances containing poisonous or caustic components or those producing toxic gasses during the drying process, cause irritations (eyes, skin, respiratory system), cause nausea or lead to death

☞ Sample materials emitting toxic substances must be dried with a special extraction system in place. Create an environment that prevents the inhalation of vapours hazardous to health.

☞ Sample materials developing aggressive vapours (e. g. acids) may cause corrosion problems on some parts of the instrument.

English

5 Transport and storage

5.1 Testing upon acceptance

When receiving the instrument, please check packaging immediately, and the appliance itself when unpacking for possible visible damage.

5.2 Packaging / return transport

- ⇨ Keep all parts of the original packaging for a possibly required return.
- ⇨ Only use original packaging for returning.
- ⇨ Prior to dispatch disconnect all cables and remove loose/mobile parts.
- ⇨ Reattach possibly supplied transport securing devices.
- ⇨ Secure all parts such as the glass wind screen, the weighing platform, power unit etc. against shifting and damage.

6 Unpacking, Setup and Commissioning

6.1 Installation Site, Location of Use

The instrument is designed to achieve reliable weighing results under normal conditions of use.
You will work accurately and fast, if you select the right location for the instrument.

On the installation site observe the following:

⚠	Remove explosion prone and easily flammable material in the immediate vicinity. Emerging vapours, sample dish and all parts of the sample chamber are hot!
⚠	Protect the instrument against direct draughts due to open windows and doors.
⚠	Avoid extreme heat and temperature fluctuations e.g. due to installation next to radiators.
⚠	
⚠	Do not expose the instrument to extreme dampness for longer periods of time. Non-permitted condensation (condensation of air humidity on the appliance) may occur if a cold instrument is taken to a considerably warmer environment. In this case, acclimatize the disconnected instrument for ca. 2 hours at room temperature.
⚠	Avoid direct sunlight
⚠	Air humidity should be kept between 45% and 75% and non-condensing.
⚠	Sufficient distance to heat-sensitive materials in the immediate vicinity of the instrument
⚠	Protect the instrument against high humidity, vapours and dust,
⚠	Major display deviations (incorrect weighing results) may be experienced should electromagnetic fields (e.g. due to mobile phones or radio equipment), static electricity accumulations or instable power supply occur. Change location or remove source of interference.
⚠	Avoid static charging of the material to be weighed, weighing container and windshield
⚠	Place the instrument on a firm, level surface.
⚠	Avoid jarring during weighing.

6.2 Unpacking and placing

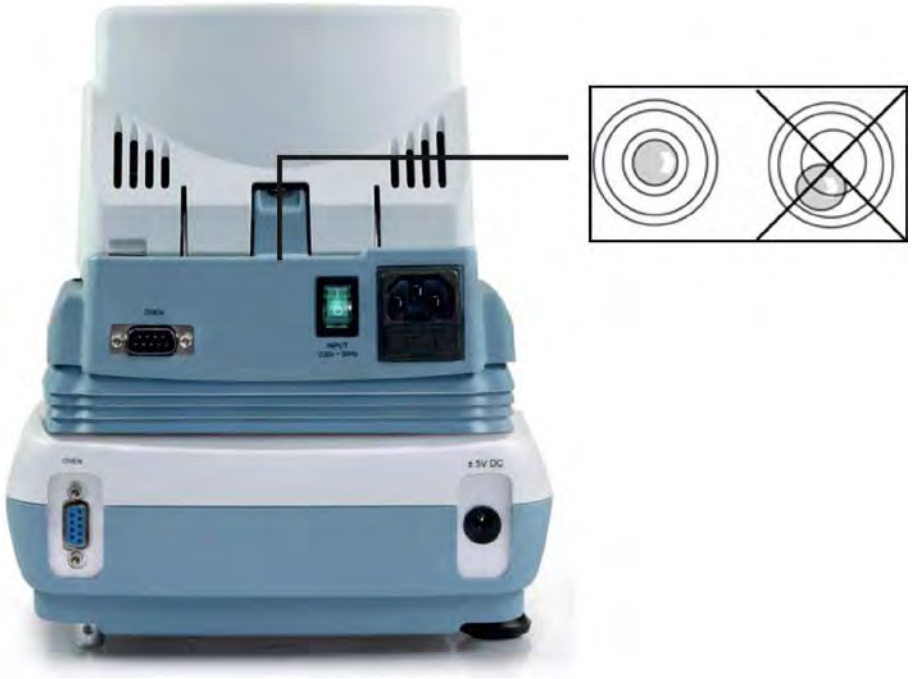
Take the instrument carefully out of its packaging, remove the plastic jacket and install it at the designated work space.

The instrument is supplied part-assembled. Immediately after unpacking check if the delivered items are complete. Assemble the separate component parts according to their sequence.

1. 
2. 
3. 
4. 

1. Put the cover inside the sample chamber.
2. Put on the dish retainer carefully.
3. Position removal aid in a way that the handle fits under the groove of the cover.
4. Put sample dish on the dish holder.

5. Level the instrument with foot screws until the air bubble of the water balance is in the prescribed circle.



Check levelling regularly.

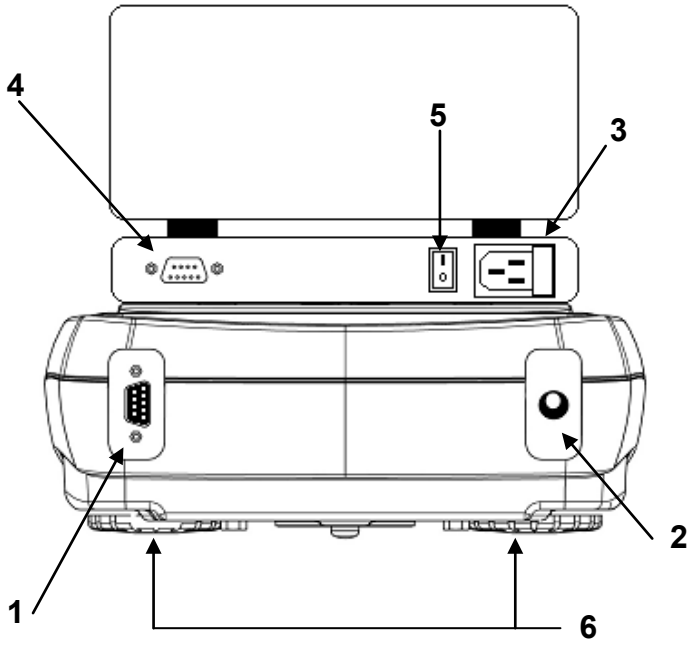
6. To adjust the reading angle, unfold both levelling feet of the terminal.

6.3 Scope of delivery / serial accessories

- For drying unit, see chap. 2
- Terminal
- 10 sample dishes
- Power cable
- Mains adapter
- Connecting cable “weighing scale – heating module - terminal”
- Operating instructions

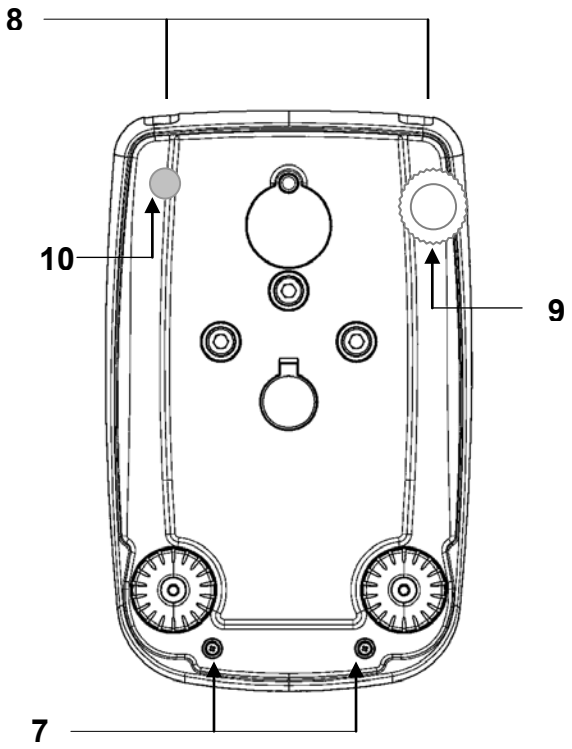
6.4 Connections

1. Drying unit



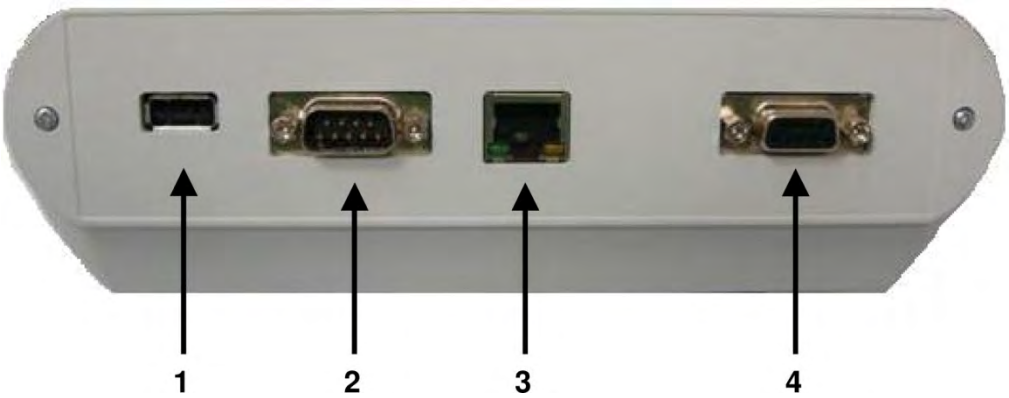
1. Connection connecting cable “weighing scale – heating module - terminal”
2. Connection net adapter „ weighing scale“.
3. Power supply “heating module”
4. Connect connecting cable “weighing scale – heating module”
5. Master switch “heating module”
6. Adjustable foot screws

English



7. Housing screws
8. Housing screws (for access remove the foot screws)
9. Adjustable foot screws
10. Rigid levelling screw

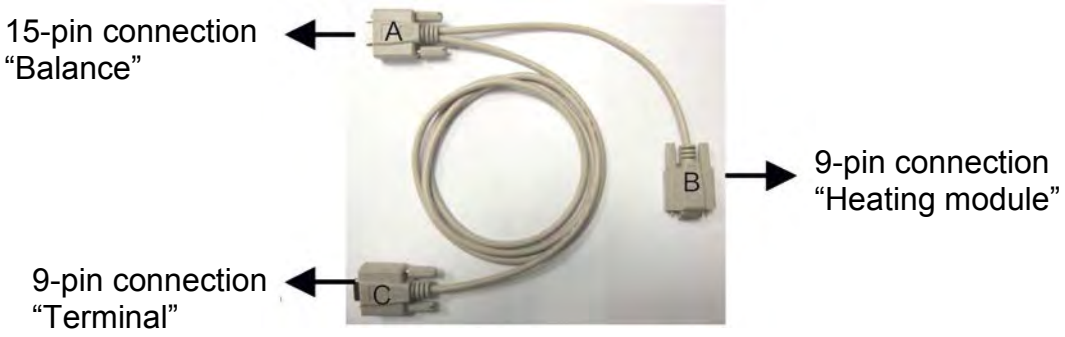
2. Terminal (rear view)



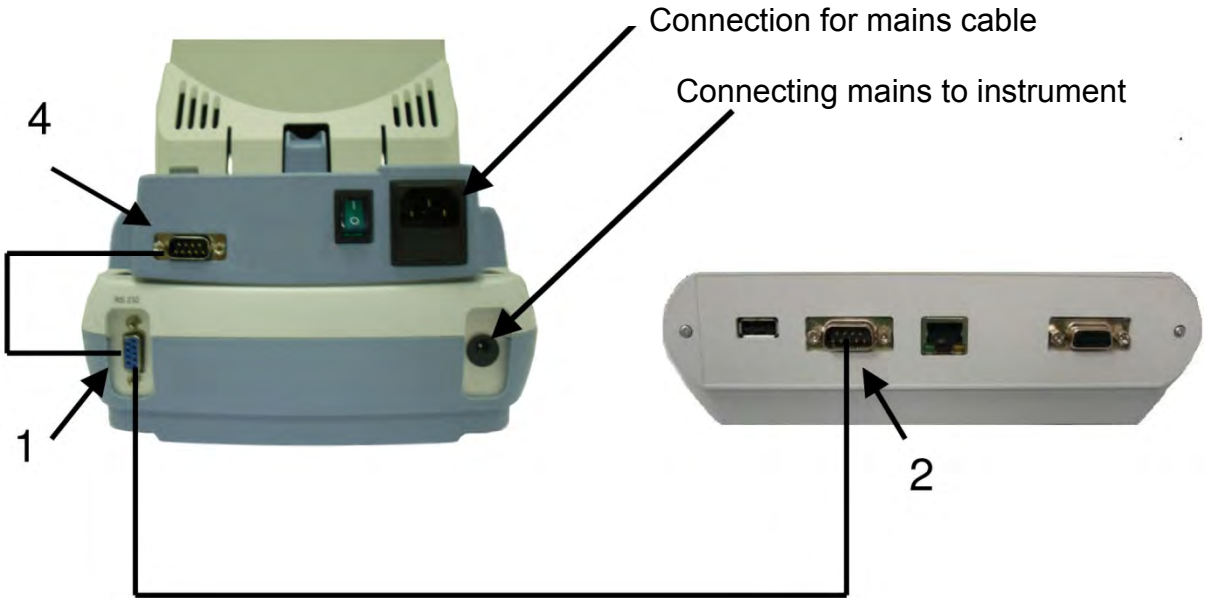
1. USB connector (host)
2. Connect connecting cable “drying unit – terminal”
3. Not documented
4. RS 232 connection

6.5 Connect terminal to drying unit

Use the connecting cable included in the delivery for the connection of “weighing scale – heating module – terminal”



- ⇨ Connect the 15-pin end [A] of the connecting cable to the socket on the weighing scale [1].
- ⇨ Connect the 9-pin end [B] of the connecting cable (short) to the socket on the heating module [4].
- ⇨ Connect the 9-pin end [C] of the connecting cable (long) to the socket on the terminal [2].



6.6 Turning On the Power

Power is supplied to the balance via the external mains instrument. The stated voltage value must be the same as the local voltage. Only use original KERN mains instruments. Using other makes requires consent by KERN.

After connection to the power supply, the LED status display will start flashing. This will finish after about 20 seconds whereupon the display will light up and show the capacity and readability of the integrated weighing scale. The instrument will be ready for operation as soon as the weight display appears.

Power supply to the heating module is provided via the supplied mains cable. Do not connect the instrument to the power grid unless the information on the instrument (sticker) matches the local mains voltage.
To switch on, press the main switch on the rear side of the instrument.
The instrument must be connected to a standard socket with earth terminal. Do not eliminate the protective effect by using an extension lead without earth terminal. For power supplies from power grids without earth terminals call a specialist to establish equivalent protection according to the relevant installation regulations.

6.6.1 Commissioning

In order to obtain exact results, the instrument must have reached its operating temperature (see warm-up time chap. 1).
For this warm-up time the instrument must be connected to the power supply.
The accuracy of the instrument depends on the local acceleration of gravity.
Strictly observe hints in chapter Adjustment.

6.7 Connecting peripheral instruments

Before connecting or disconnecting of additional devices (printer, PC) to the data interface, always disconnect the moisture analyser from the power supply.
Only use accessories and peripheral devices by KERN, as they are ideally tuned to the instrument.

6.8 Adjustment

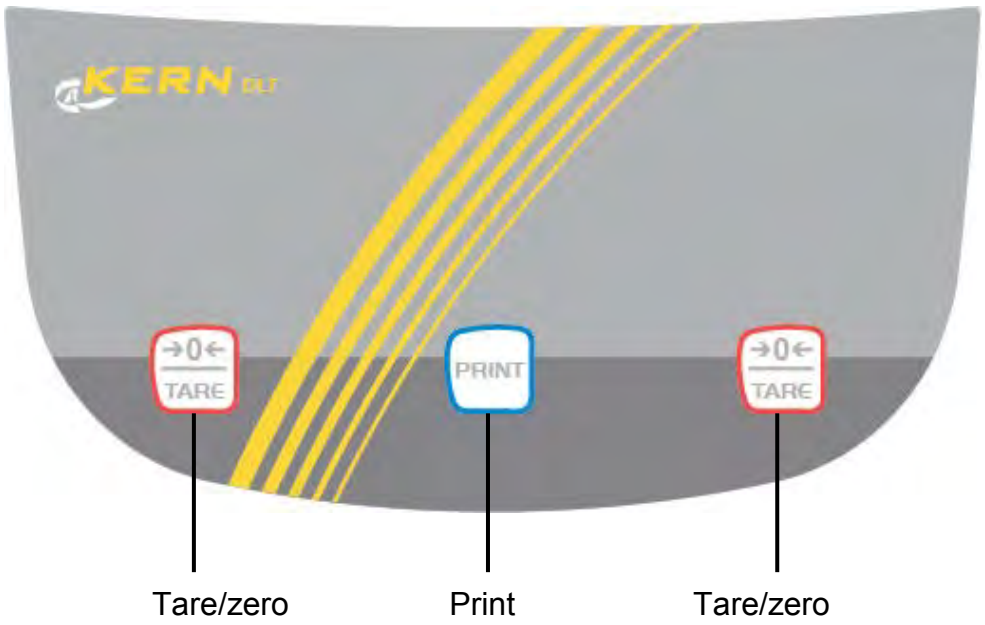
To obtain accurate measurement results, you need to adjust the integrated weighing scale and the heating module.
Adjusting is required:

- Before working with the instrument for the first time.
- At regular intervals
- After changing location

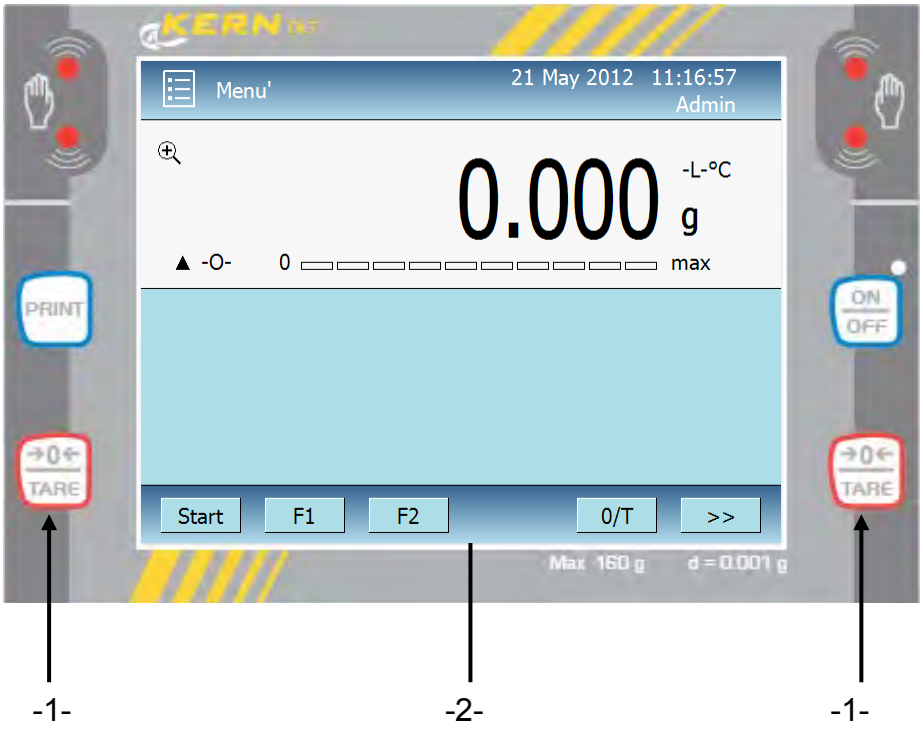
For information on how to carry out an adjustment for integrated weighing scales see chap. 9.6.1, for temperature adjustment see chap. 9.7.1.

7 Operating elements

7.1 Drying unit



7.2 Terminal



-1- Keyboard
-2- Touch screen

7.2.1 Keyboard overview

Key	Description	
1	Non-contact sensors Adjustable function (TARE / PRINT / turn off)	
2	Print measurement result	
3	Taring Zeroing	
4	LED status display:	
	Off	When instrument is ready for operation
	On	In standby mode
	Flashes	During data transfer
5	Turn on/off (standby mode) Note: We recommend that you do not disconnect the instrument from the power supply unless you are intending not to work with it for a longer period of time.	

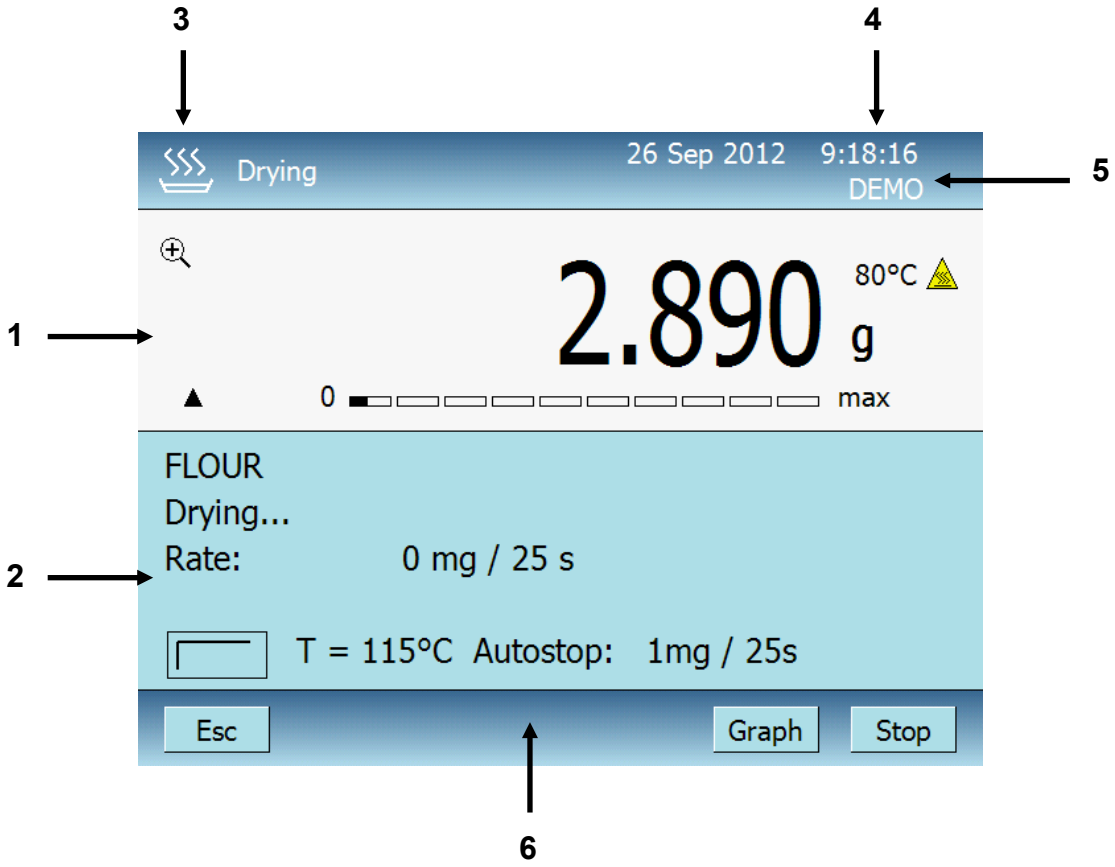
English

7.2.2 Touchscreen

The colour touch screen is a touch-sensitive display device. The touch screen not only shows information but can also be used for entering commands by tapping certain areas of the surface.

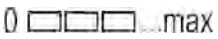
Keys on touch screen

Do not operate the touch screen by using a pointed or sharp objects!
This may damage the touch screen.



1	Measured value display Displays current measured values for operating procedure

Functions and related symbols

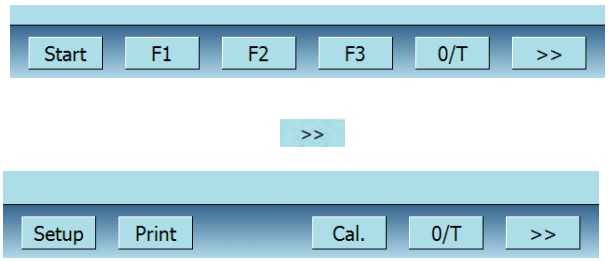
	Zoom function: Zoom out / zoom in measured value display
g	Unit display To change unit, touch symbol
▲	Stability display
-0-	Zero indicator
56°C	Temperature indicator
	The bar graph display moves from the left to the right and proceeds equally to the weight loaded onto the weighing balance. Its full width is reached at maximum load.

2	Parameter display Displays the parameter set for the measurement in progress
3	Status bar “Drying” shows the drying process in progress or To call functions menu, tap on “Menu”
4	Date and time display Tap, to set date / time
5	Benutzername, Tap, to call “User Profiles” menu

English

Functions and related symbols

>> Tap, to change from one key to the next



Start Tap, to call “Moisture Setting” menu and to start measuring

Setup Tap, to call “Instrument Setting” menu

Print Tap, to read-out / print data

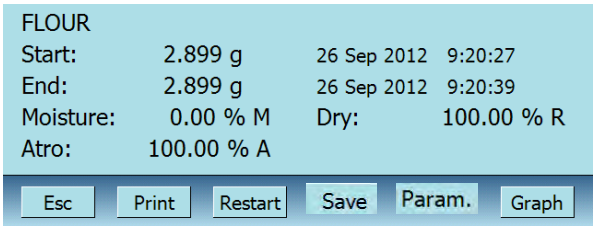
F1-F3 User-specific shortcut keys (F1-F2- F3) for calling the 3 most frequently applied drying programs

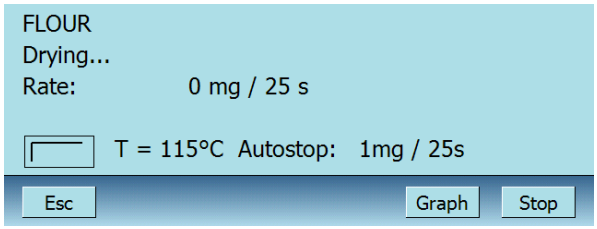
Cal Tap, to start adjusting

0/T Tap, to tare/zero set the weighing scale

English

Keys available during and after measuring





Esc	Tap to cancel measuring
Print	Tap to print a measuring log
Restart	Tap to restart measuring
Save	Tap to save the mesaurement result
Param.	Tap to display the currently set drying parameters.
Graph	Tap to portray a drying curve
Stop	Tap to finish measuring

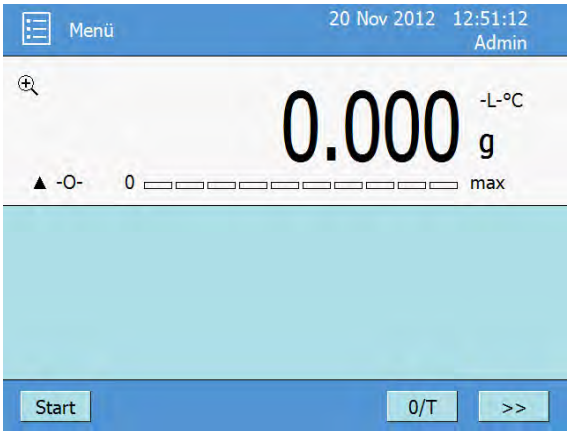
English

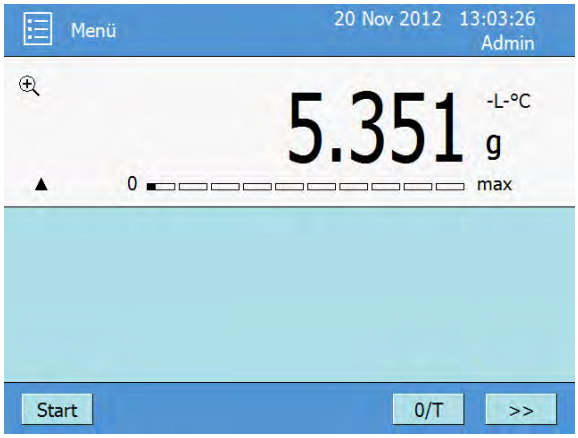
8 Single weighing / tare

In order to obtain exact weighing results, your balance must have reached the operating temperature (see warming up time chap. 1).

Start-up:
After connection to the power supply, the LED status display will start flashing. This will finish after about 20 seconds whereupon the display will light up and show the capacity and readability of the integrated weighing scale. The instrument will be ready for operation as soon as the weight display appears.

Weighing:





1. Wait for zero display or, where applicable, set to zero via **0/T**-key,
2. Place goods to be weighed on balance.
3. Wait until the stability display appears ▲.
4. Read weighing result.

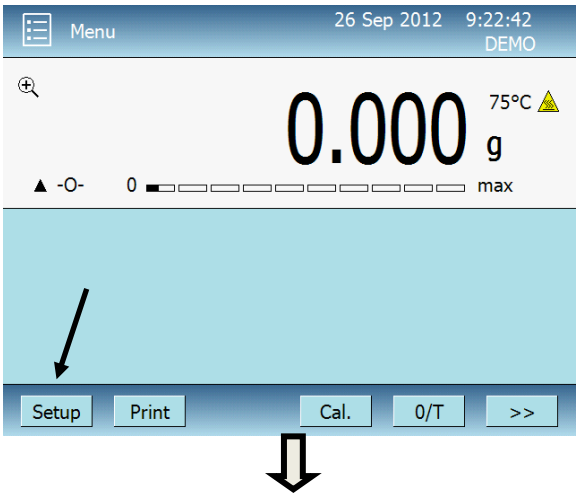
Taring:

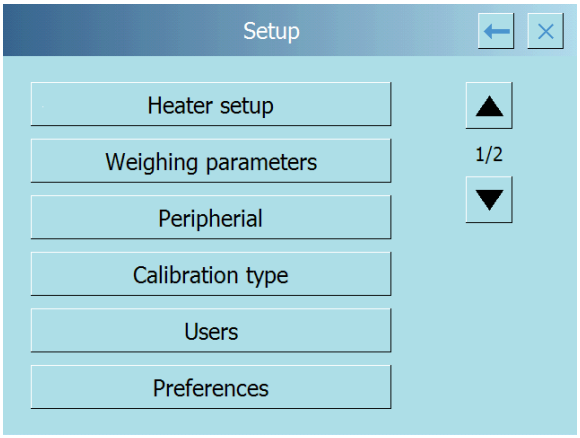
1. Put weighing container on the weighing pan.
2. Wait until stability display appears ▲ then tap the **0/T**-key.
3. After standstill control the zero display appears. The weight of the container is now internally saved.
4. Weigh the material.
5. Wait until the stability display ▲appears ().
6. Read net weight.

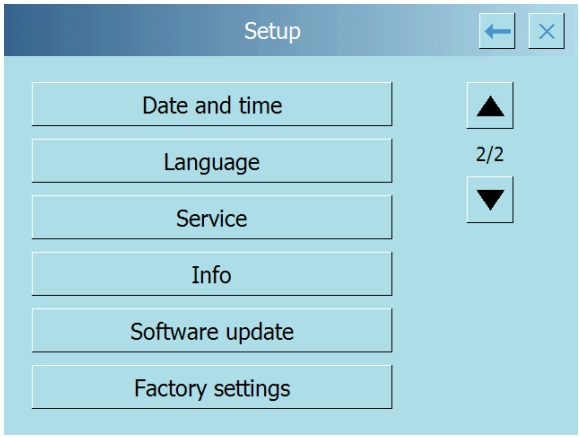
9 Setup menu

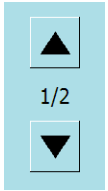
This menu item is used to make customised default settings for the instrument. The settings are saved together with the current user profile and apply when working with this particular profile. When a user profile is called, all the related settings will be loaded automatically, see chap. 9.3.

⇨ To call set up menu, tap the command button Setup
The menu overview appears.









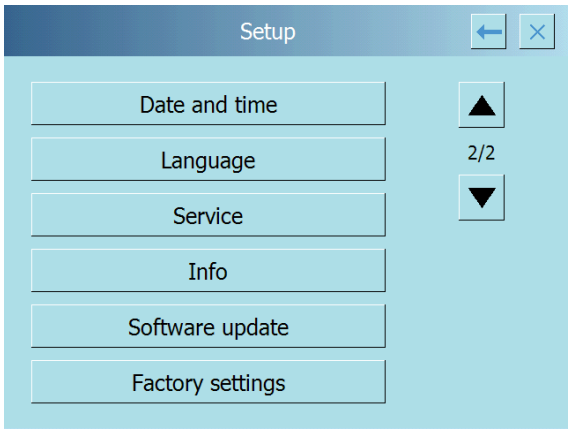
Display of available pages

Use cursor ▲▼ to scroll up and down

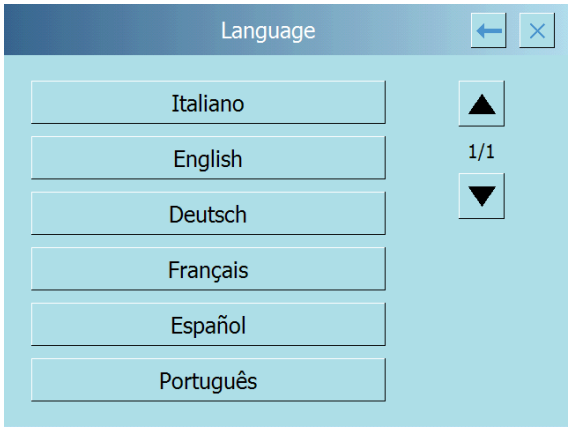
Back to previous view ←  → Exit menu

English

9.1 Language



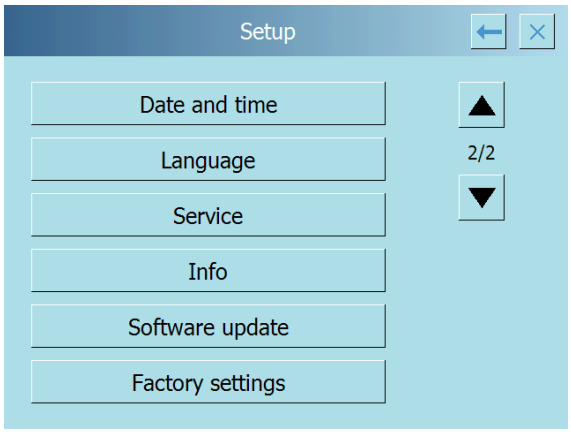
To set the language for terminal operation, tap the command button Language on page 2.



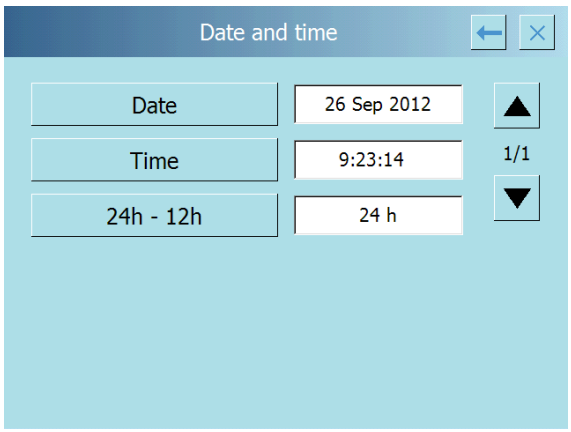
Tap the command button for the required language and all displays will be shown in the language of your choice.

English

9.2 How to set date/time



To set date and time, tap the command button Date and time on page 2.



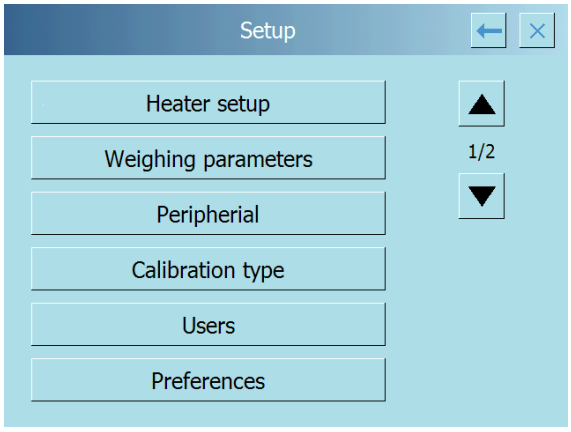
Tap the relevant command button and the numeric entry window will appear.

Import entry by tapping OK or tap ✕ to cancel. The display returns to the previous screen.

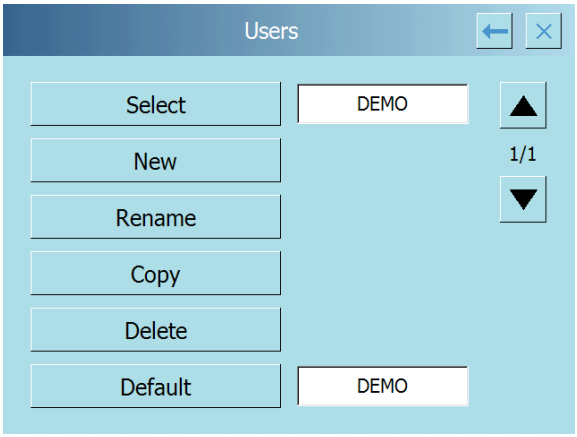
English

9.3 User profile

This menu is used to create, edit or delete user profiles.
Each user is allocated his/her own profile with specific settings (default settings of instrument, complete database).
You can use an USB stick to transfer it to additional instruments, see chap. 12.2.
The factory setting is “Admin”. This cannot be deleted or renamed.



Tap command button Users on page 1.

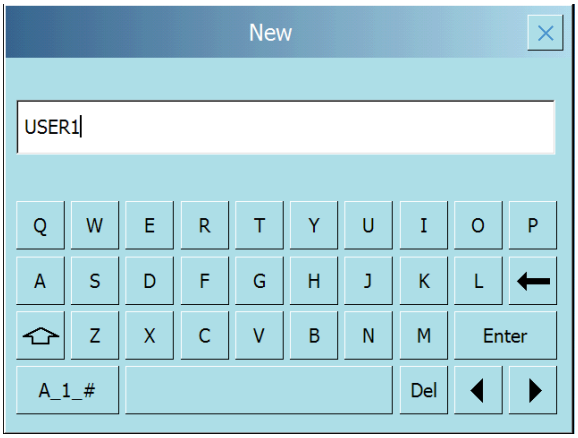


- **Select** Select user profile
- **New** Create new user profile (max. 10 profiles), Tap command button and the entry window will appear, see chap. 9.3.1.
- **Rename** Rename user profile
- **Copy** Copy user orofile
- **Delete** Delete user profile
- **Default** User profile standard (Select required profile from list.)

For entry of “user name” max. 20 characters

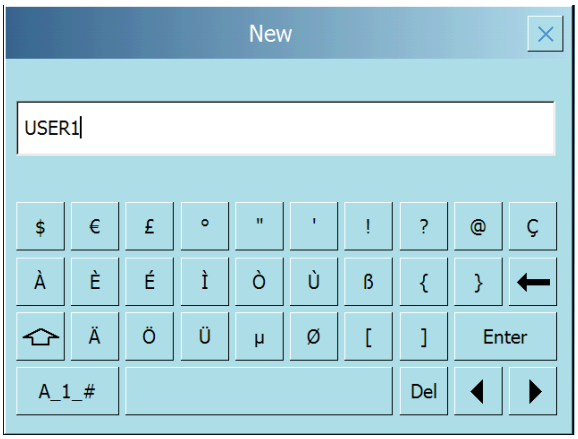
9.3.1 Alphanumeric entry window

Mod.1



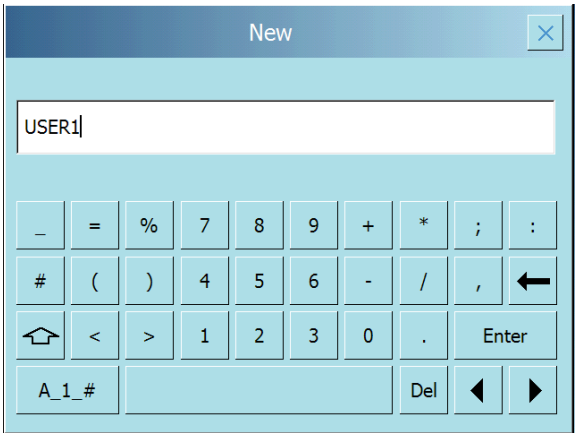
A_1_#

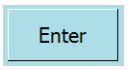
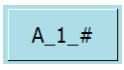
Mod.2



A_1_#

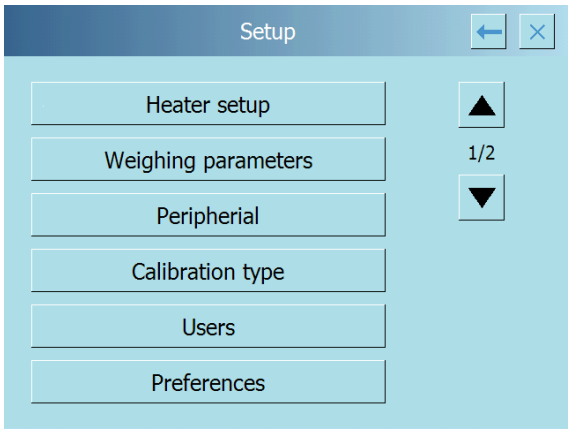
Mod.3



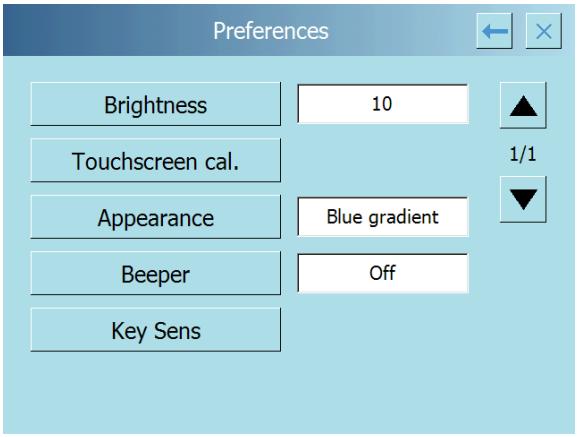
Command button	Function
	Upper case/lower case letters
	Delete character entered last
	Delete all entered characters
	Position cursor forward/back
	Confirm entry and save
	Character selection: Mod.1 Mod.2 Mod.3

English

9.4 Display default settings



Tap command button
Preferences
on page 1.

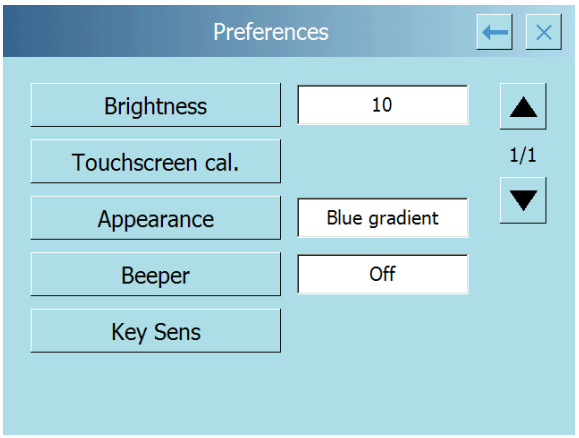


Displays the available default settings:

- Brightness
- Alignment of display
- Colour scheme
- Beep tone on key pressure
- Status of non-contact sensors

English

9.4.1 Brightness



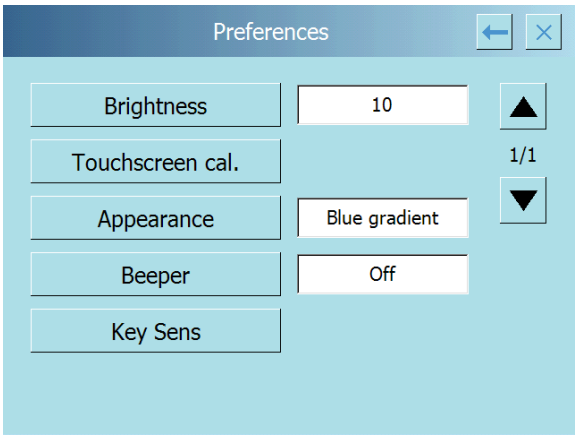
Tap command button Brightness

Tap required setting,
10 levels selectable

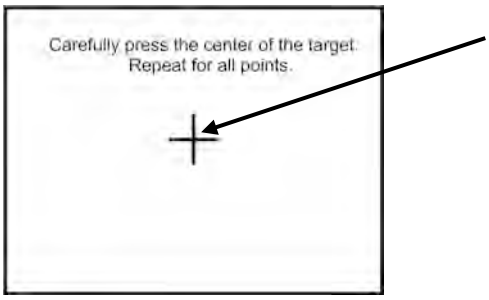
English

9.4.2 Setting touch screen alignment

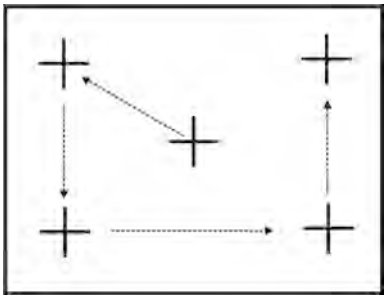
If the alignment of the non-contact areas of the display does not exactly match the position of the command buttons you can correct it by using this function.



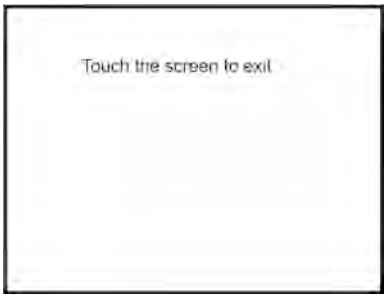
Tap command button Touchscreen cal..



To adjust the touch screen, follow the on-screen instructions.
Take a pen and touch the centre of the cross as accurately as possible.



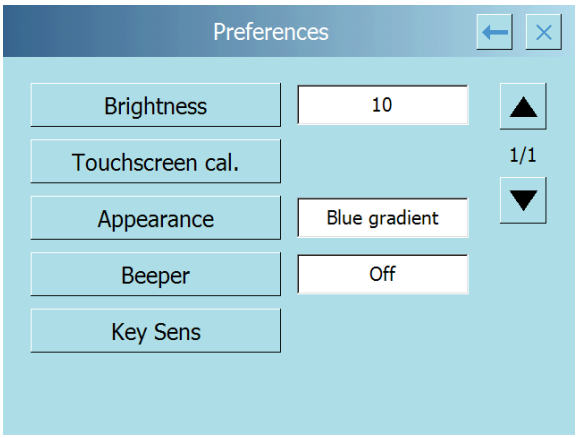
Repeat this process for all points.



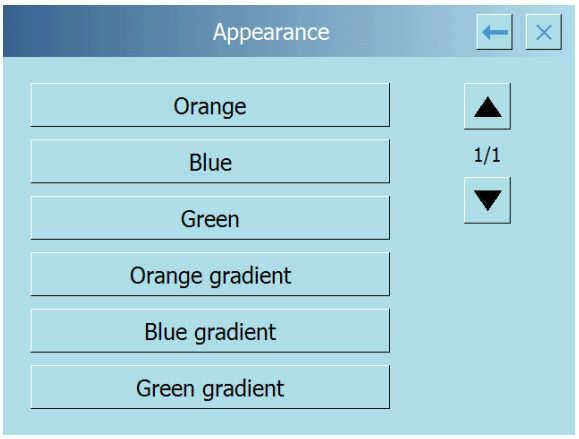
To confirm, tap the display.

- ☞ Make sure that you do not touch any other areas whilst carrying out adjustment.
- ☞ Do not touch the display with your hand.
- ☞ You cannot cancel adjustment.

9.4.3 Colour scheme

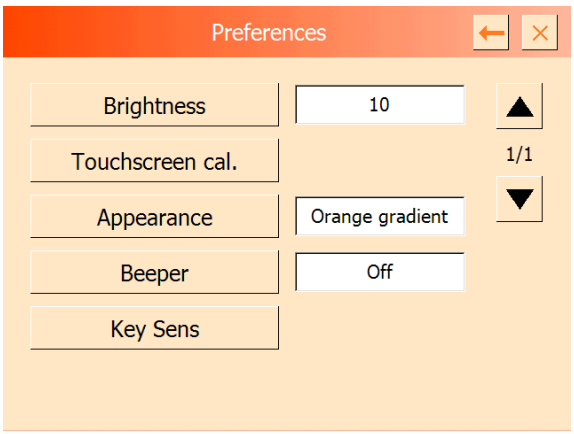


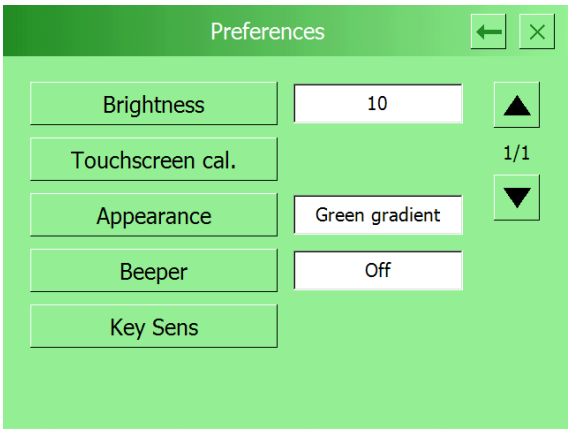
Tap command button Appearance



Tap the required setting.
6 colours selectable

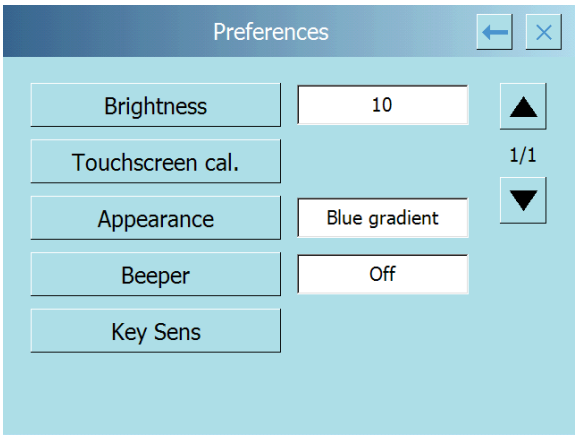
Examples:



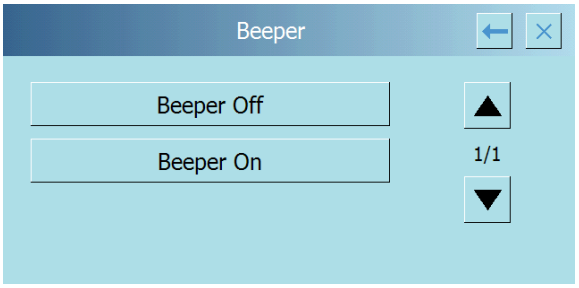


English

9.4.4 Beep tone on key pressure



Tap command button Beeper



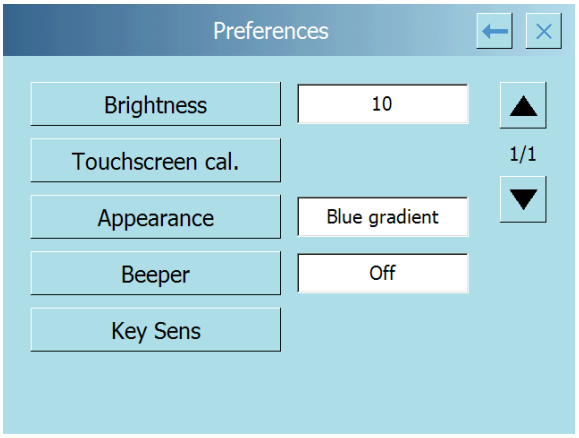
Tap the required setting.

off: switched off

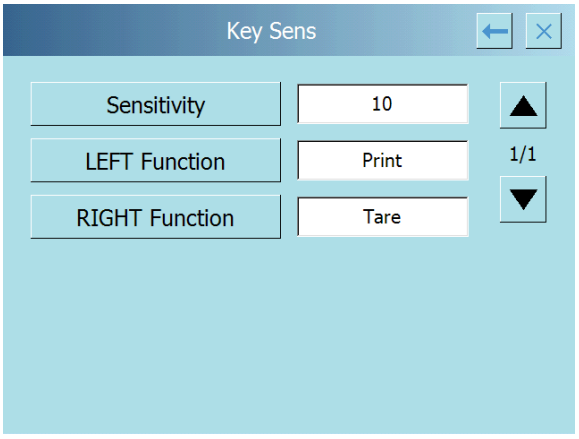
on: switched on

English

9.4.5 Status of non-contact sensors



Tap command button Key Sens.



- **Sensitivity**

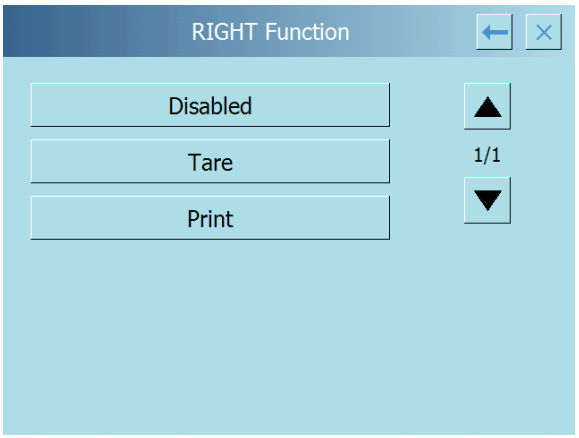
10 levels selectable

Level 1: Distance to sensor 2 cm

Level 10: Distance to sensor 30 cm

- **LEFT Function – RIGHT Function**

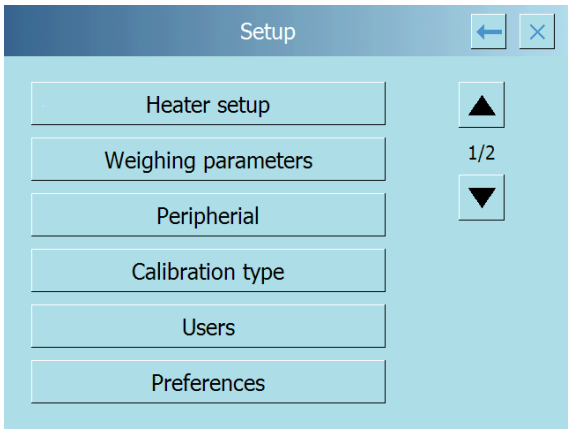
While enabling the two sensors you can allocate a function to them (tare, print).



- **Disabled** Sensor function disabled
- **Tare** Sensor function “Tare”
- **Print** Sensor function “Print”

English

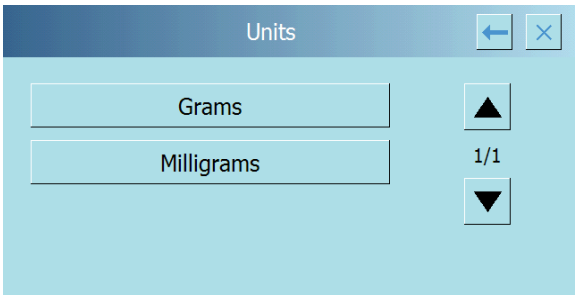
9.5 Balance settings



Tap command button
Weighing parameters on page 1.

The available settings are displayed:

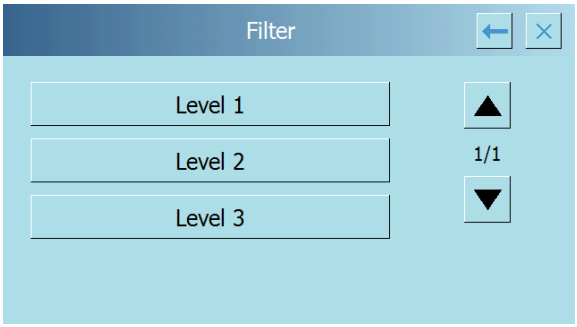
- Weighing Units
- Filter
- Stability
- Autozero



- **Weighing Units**

Tap the required setting.

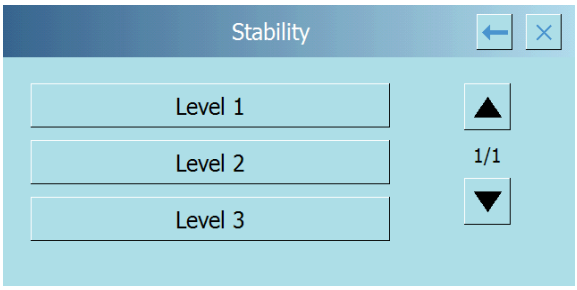
“g” or “mg” selectable



- **Filter**

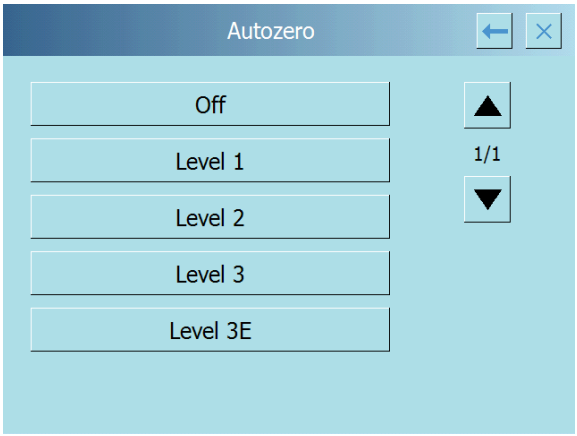
This menu item allows the balance to be set according to specific ambient conditions and measuring purposes.

Level 1	Setting for dispensing
Level 2	The balance reacts quickly and in a sensitive manner, very quiet set-up location.
Level 3	The balance reacts slowly and in a robust manner, busy set-up location



- **Stability**

Level 1	Very quiet setup location
Level 2 Factory setting	Steady location
Level 3	Very busy setup location



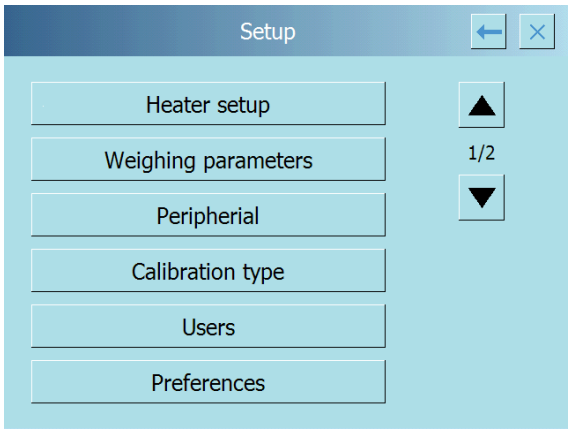
- **Autozero**

Under this menu item the automatic zero point correction can be switched on or off. In switched-on-state the zero point is automatically corrected at drift or when dirty.

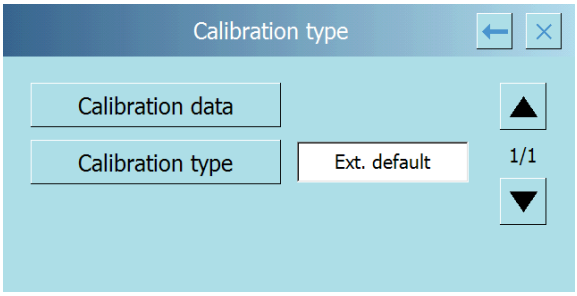
Off	Auto Zero switched off
Niveau1	Auto Zero range ± ½ Digit
Niveau2	Auto Zero range ± 3 Digits
Niveau3	Auto Zero range ± 7 Digits
Niveau3E	Auto Zero range ± 7 digits in the whole weighing range

English

9.6 Settings for weighing scale adjustment

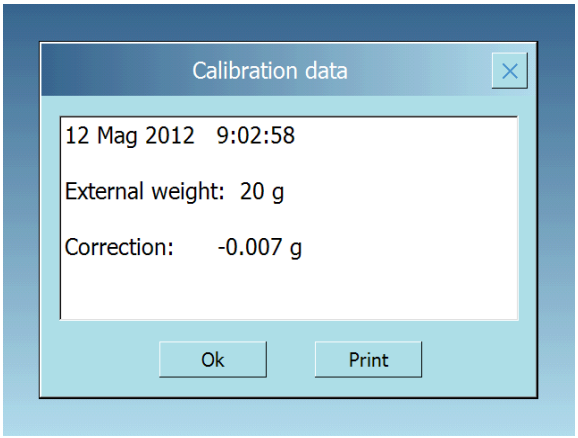


Tap command button
Calibration type
on page 1.



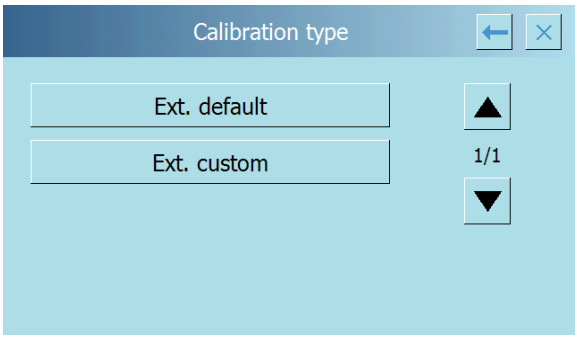
The available settings are displayed:

- Adjustment data
- Adjustment mode



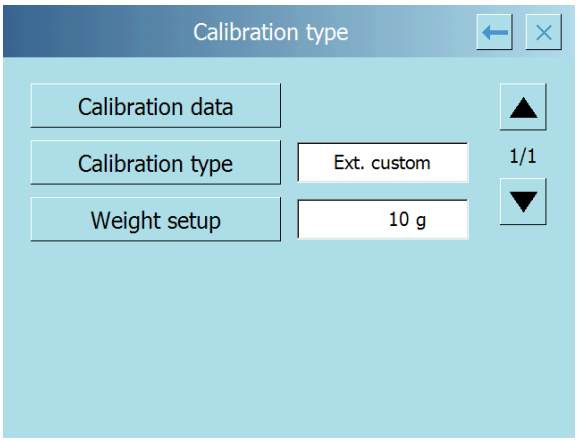
- **Calibration data**

Display/print data for last adjustment



- **Calibration type**

Ext. Default: Adjustment with external adjustment weight “factory setting”



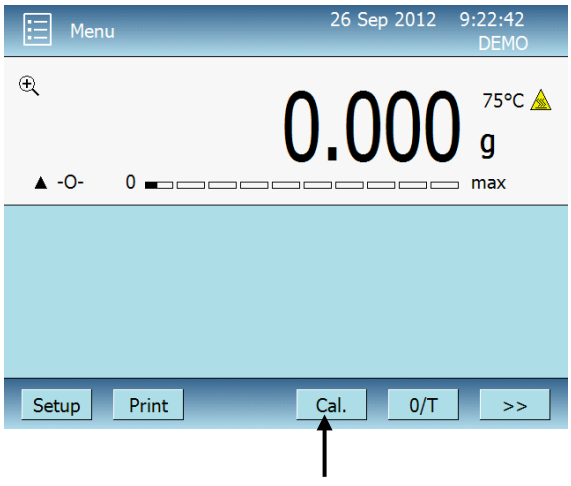
Ext. custom: Adjustment with external adjustment weight “user-defined”

Tap command button Weight setup and the numeric entry window will appear. Enter required value for adjustment weight.

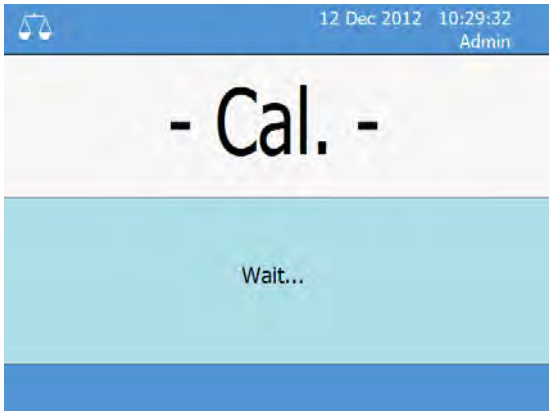
Import entry by tapping OK or tap ✕ to cancel. The display returns to the previous screen.

9.6.1 Adjusting a weighing scale

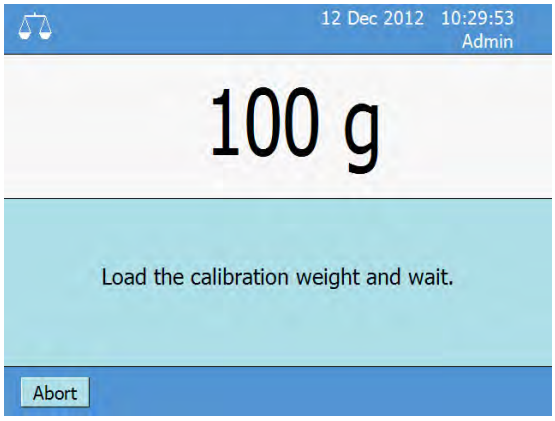
- Observe stable environmental conditions. A warming up time (see chapter 1) is required for stabilization.
- Carry out adjustment with placed sample dish. Ensure that no objects are within the sample dish.
- We recommend carrying out adjustment in adjusting mode “Ext.default” where adjustment is taking place close to the maximum load allowed for the weighing scales (For recommended adjustment weight see chap. 1).
  Adjusting mode “Ext.” also allows adjustment with weights of different nominal values but from a metrological point of view this is not optimal.
- Info about test weights can be found on the Internet at: http://www.kern-sohn.com



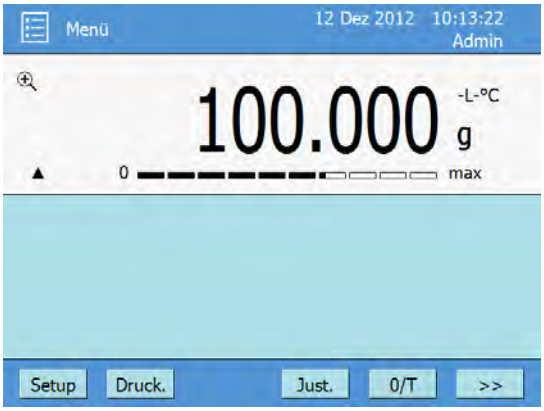
⇨ Tap command button Cal.



⇨ Wait until the weighed value for the required adjustment weight appears flashing.



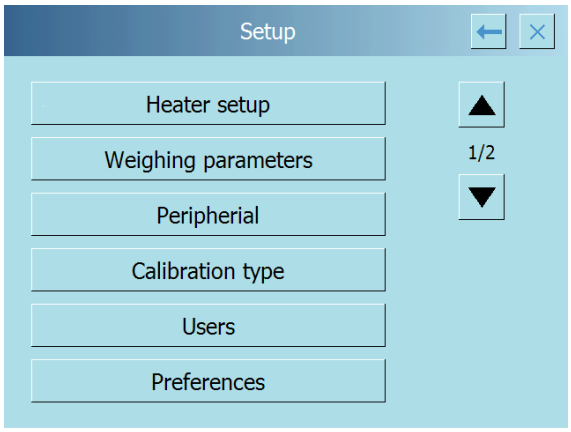
⇨ **During** the flashing display put the required adjustment weight carefully in the centre of the sample dish.
The flashing display disappears.
After successful adjustment the balance automatically returns to weighing mode.



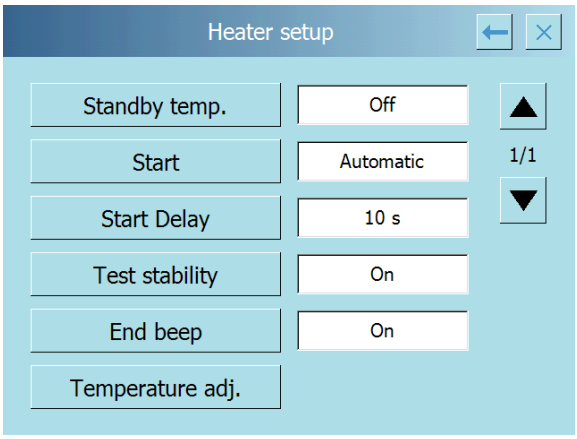
⇨ Take away adjustment weight

In case of an adjustment error (e.g. objects on the weighing plate) the display will show an error message, repeat adjustment.

9.7 Settings heating module

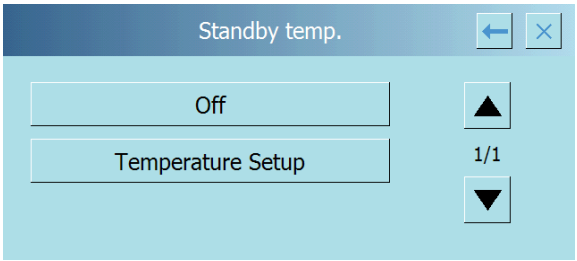


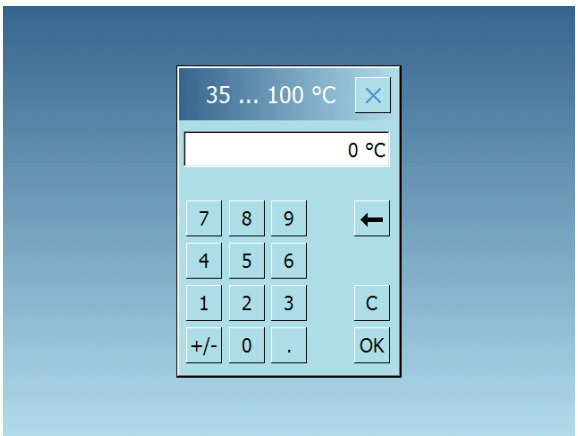
Tap command button Heater setup on page 1.



Displays the available default settings:

- Standby temperature
- Start criterion
- Start delay
- Stability control
- Acoustic signal after completed measuring
- Temperature adjustment



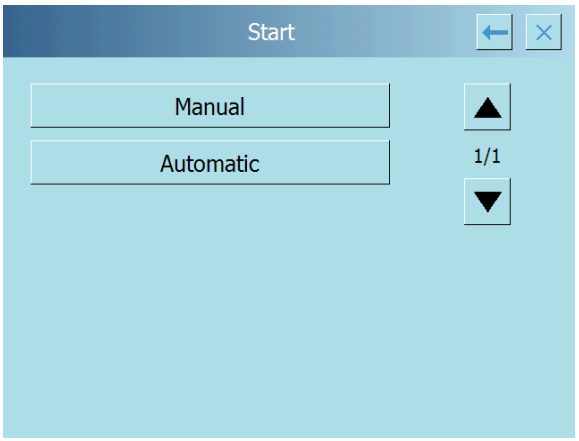


- **Standby temperature**

Tap required setting

Off	Turned off
Temperature **Setup**	The numeric entry windows will appear. Enter required temperature, available range 35°C – 100°C. Import entry by tapping OK or tap ✕ to cancel. Display returns to previous screen.

English

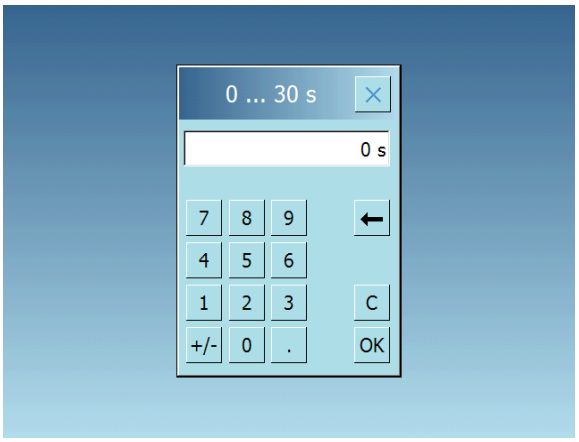


- **Start criterion**

Tap required setting

Manual Measurement starts after tapping “OK” command button.

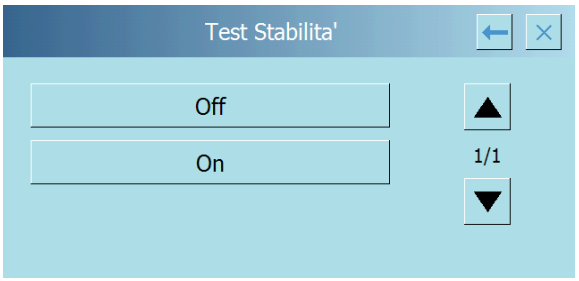
Automatic Measurement will start automatically as soon as sample chamber has been closed.



- **Start delay**

Tap command button Start Delay. The numeric entry windows will appear. Enter required time, available range 0- 30 sec.

Import entry by tapping OK or tap to cancel. Display returns to previous screen.

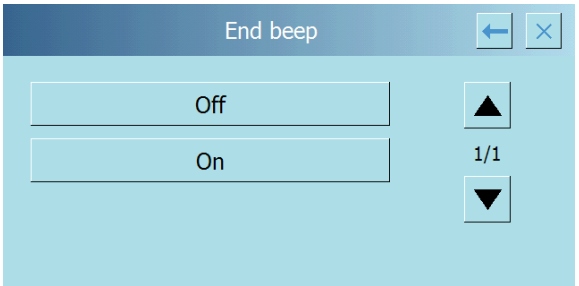


- **Stability control**

Tap required setting

Off Stability control turned off before start of measurement

On Stability control turned on before start of measurement



- **Audio signal**

Tap required setting

Off Turned off

On Turned on, sounded after end of measurement

9.7.1 Calibrate / adjust temperature

We recommend sometimes to check the temperature value of the instrument using the optional temperature calibrating set DLB-A01. Before you do this, allow the instrument to cool down for at least 3 hours after the last heating phase.

Preparation:

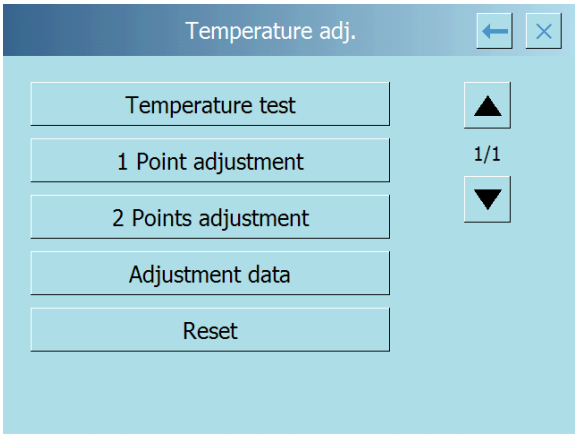
⇨ Remove the separate component parts „sample dish“ according to their sequence

1. 
2. 
3. 
4. 

⇨ Install the temperature-calibration set acc. to fig..

⇨ Turn on heating module on the back.
⇨ Close cover of heating module
⇨ On the temperature calibration set switch-on the digital thermometer by the **ON** button.

Call function:

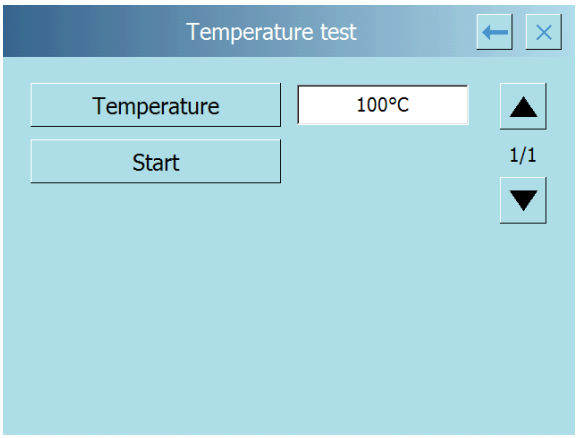


Tap command button Temperature adj..

Available settings are displayed.

Temperature **test**	Selectable 35-160°C
1 Point adjustment	Single point temperature adjustment
2 Point adjustment	Two point temperature adjustment
Adjustment data	Show/print adjustment data
Reset	

1. Temperature test



- **Temperature test**

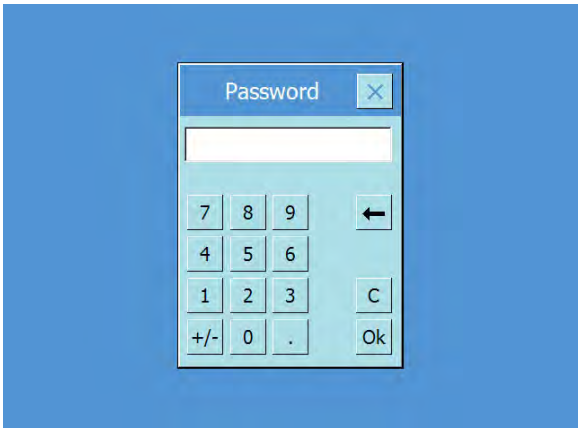
This function is merely used to check the temperature; no changing of values takes place.

Tap command button Temperature test.
The numeric entry windows will appear.
Enter test temperature,
selectable 35-160°C.

Tap command button Start.
The test takes 15 minutes.

At the end of the test compare test temperature with temperature displayed on the DLB-A01. If the two values do no match, we recommend carrying out temperature adjustment.

2. Single point temperature adjustment

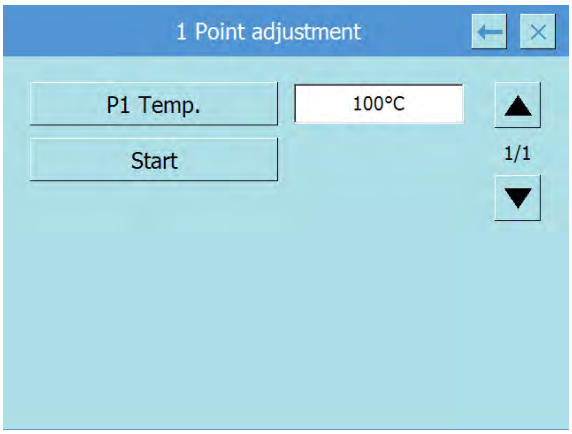


- **1 Point adjustment**

Tap command button 1 Point adjustment.

The password query appears.

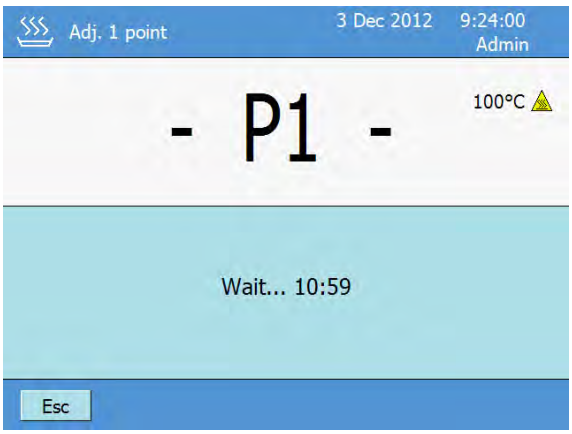
Enter password 1122 and confirm by tapping OK.



The currently set test temperature will be shown.

To change, tap P1 Temp. . The numeric entry windows will appear. Enter test temperature and confirm by tapping OK .

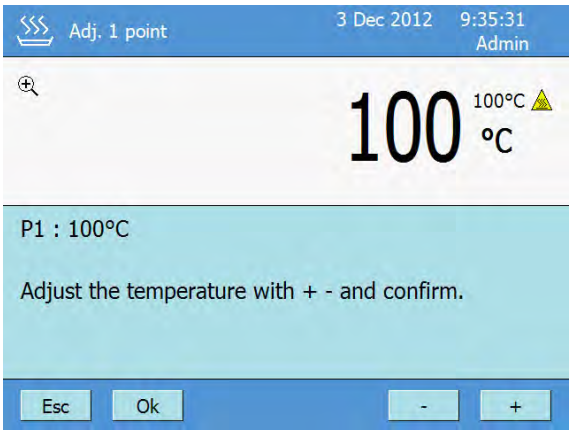
Tap command button Start.



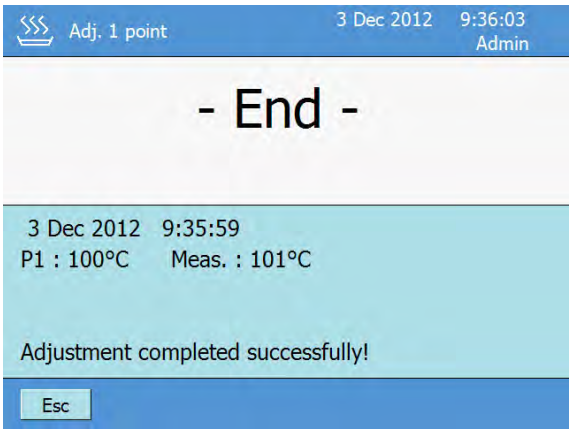
Adjustment starts. The current temperature and the remaining time will be shown on the display.

To determine the set temperature, the instrument will be heating up to target temperature.

English



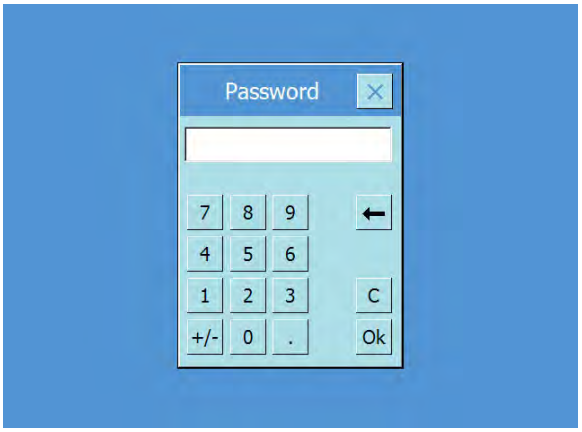
Temperature adjustment finishes after 15 min. Compare the temperature displayed on the thermometer with that of the heating module. If the two values do not match, go to the command buttons - + and correct, then confirm by tapping OK.



Tap Esc back to menu.

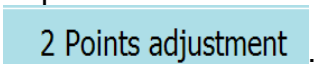
English

3. Two point temperature adjustment



- **2 Point adjustment**

Tap command button

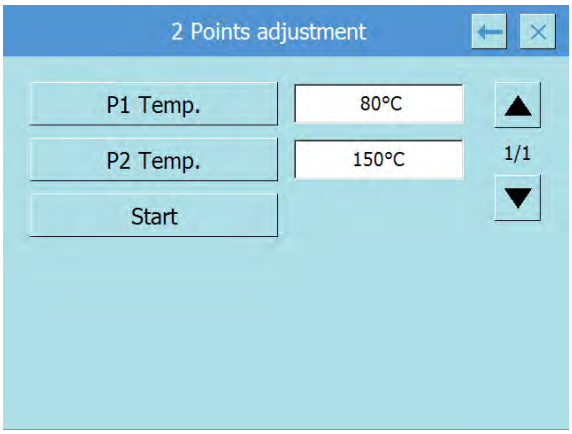


.

The password query appears.

Enter password 1122 and confirm by tapping

.



The currently set upper and lower test temperature will be shown.

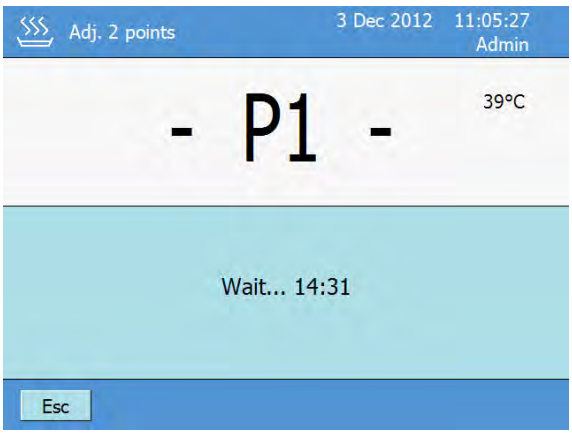
To change, tap

. The numeric entry windows will appear. Enter test temperature and confirm by tapping

.

Tap command button

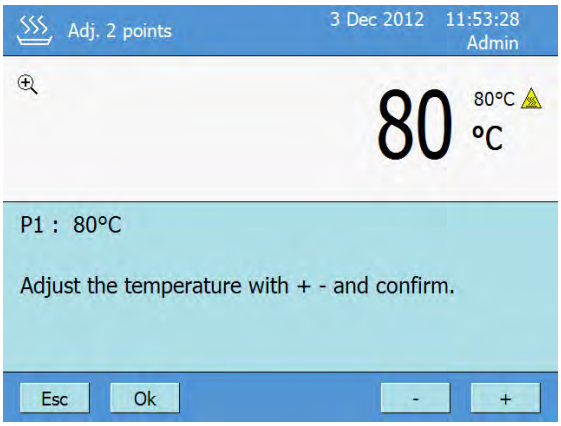
.



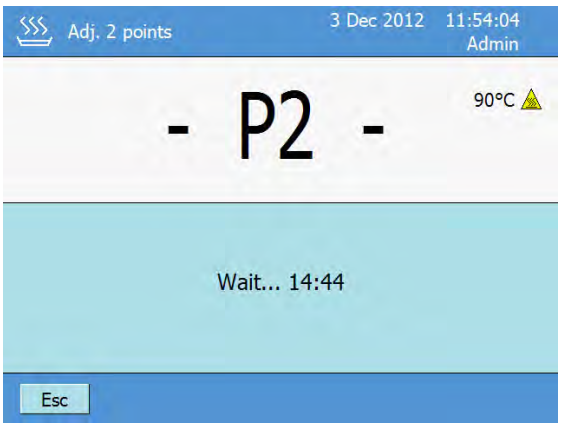
Adjustment starts. The current temperature and the remaining time will be shown on the display.

To determine the set temperature, the instrument will now be heating up to target temperature 1.

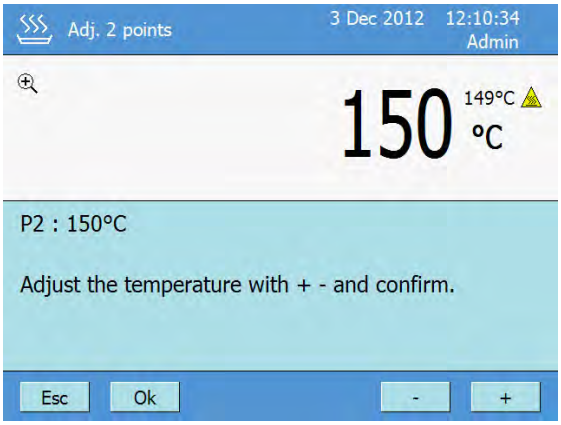
English



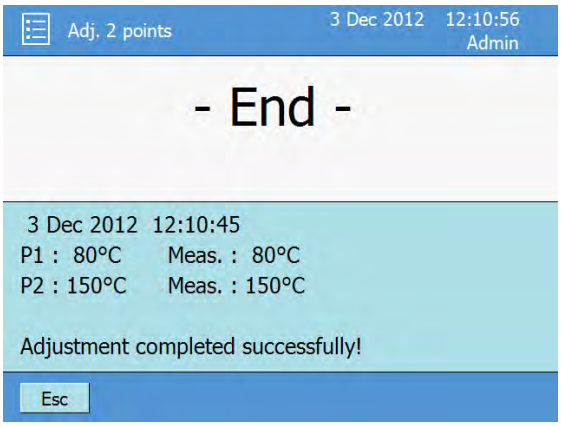
Temperature adjustment for target temperature 1 will be completed after 15 minutes. Compare the temperature displayed on the thermometer with that of the heating module. If the two values do not match, go to the command buttons - + and correct, then confirm by tapping OK.



To determine the set temperature, the instrument will continue to heat until it reaches target temperature 2.

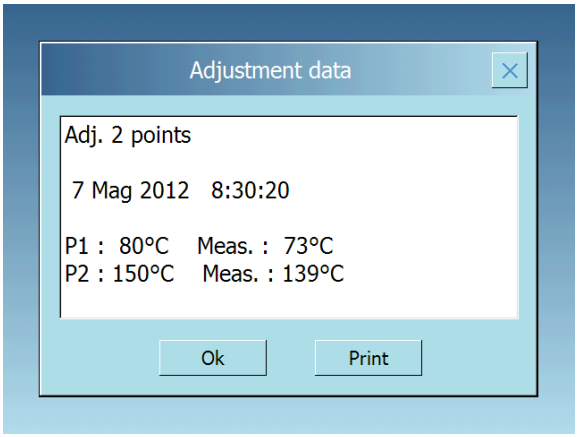


Temperature adjustment for target temperature 2 will be completed after 15 minutes. Compare the temperature displayed on the thermometer with that of the heating module. If the two values do not match, go to the command buttons - + and correct, then confirm by tapping OK.



Tap Esc back to menu.

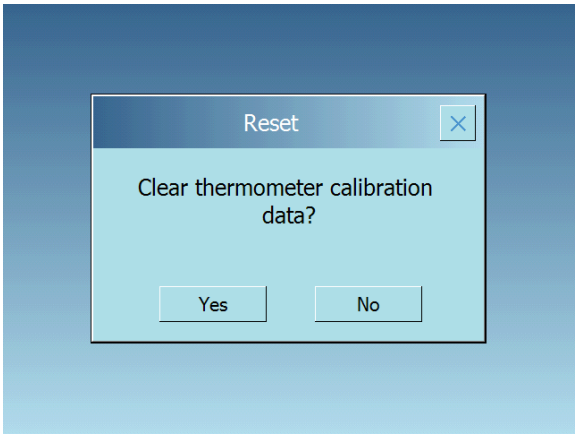
4. Show/print adjustment data



- **Adjustment data**

To display or print adjustment data, tap the command button Adjustment data.

5. Delete temperature data



- **Reset**

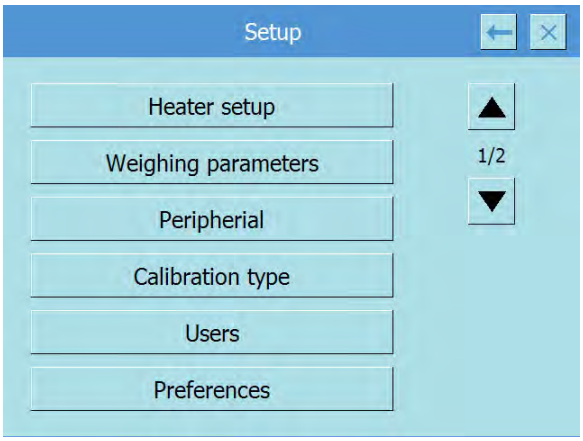
Tap required setting

YES Attention:
Carry out the reset function only if a temperature recalibrating kit is available that allows you to carry out the necessary recalibration.

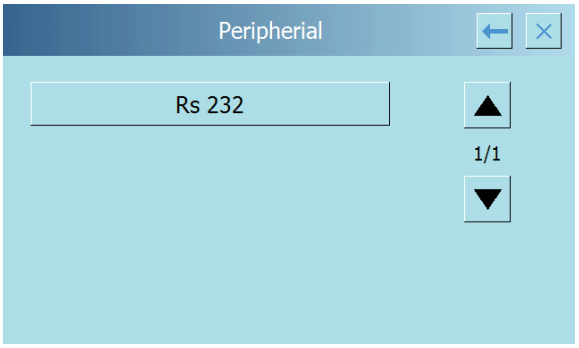
No no

English

9.8 Settings peripheral instruments

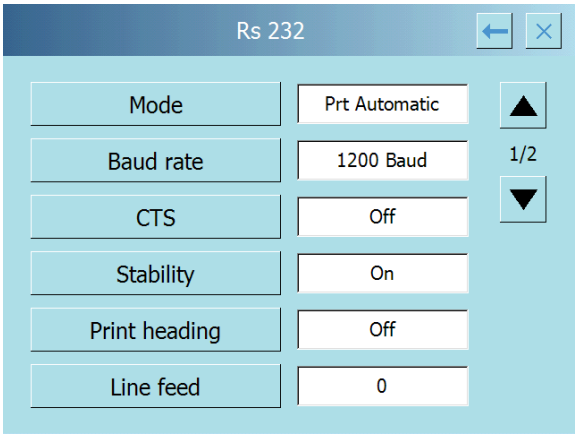


Tap command button Peripherial on page 1.

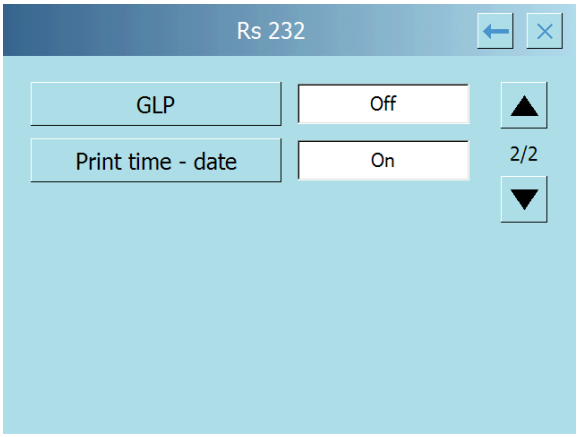


Tap command button Rs 232

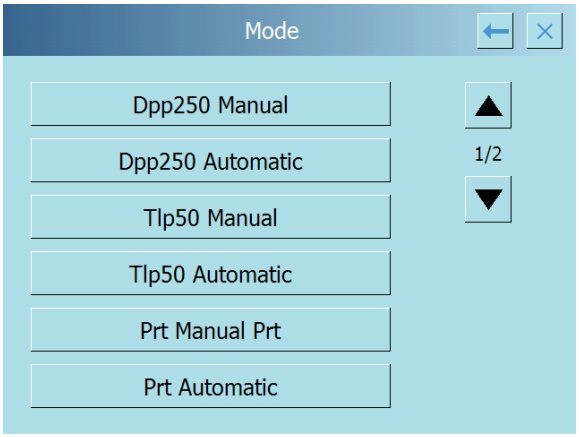
Page 1:

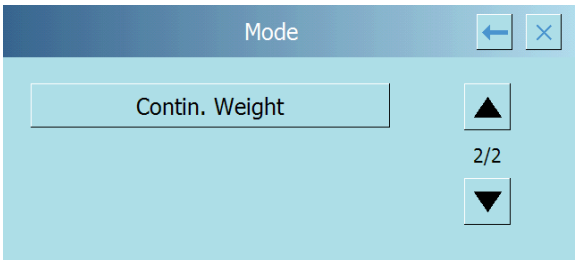


Page 2:



The current RS232 settings are shown (white fields).
To change, tap blue command button.





- **Mode**

Tap required setting

Dpp250 Manual: Not documented

Dpp250 Automatic: Not documented

Tlp50 Manual: Not documented

TlP50 Automatic: Not documented

Prt Manual print: Standard printer Data output after pressing **PRINT**.

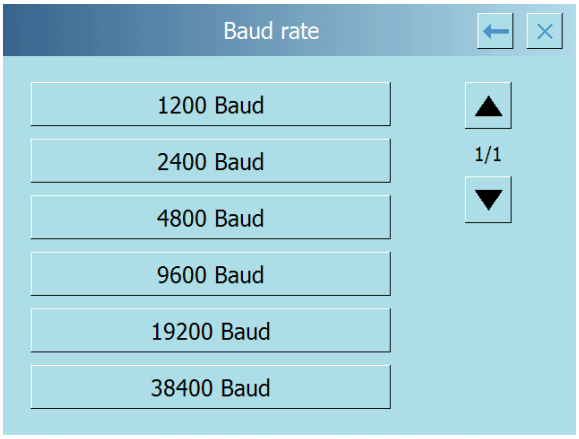
PRT Automatic. Standard printer Automatic data output after end of measuring

Continous weight: Standard printer continuous data output residual weight.

Note:

Drying graphs cannot be printed by a standard printer

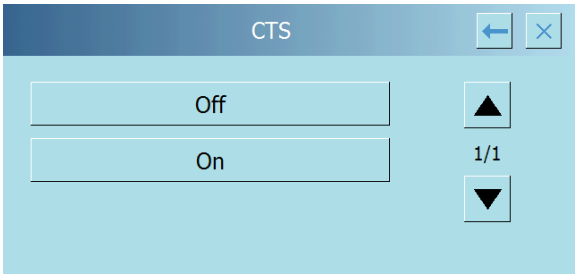
(Dpp 250or Tlp 50 only).



- **Baud rate**

Setting speed of data transfer

selectable 1200, 2400, 4800, 9600, 19200, 38400 baud.



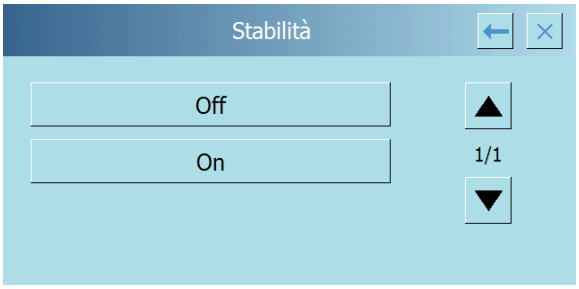
- **CTS**

Data flow control by RFR/CTS

Off: deactivated

On: activated

English

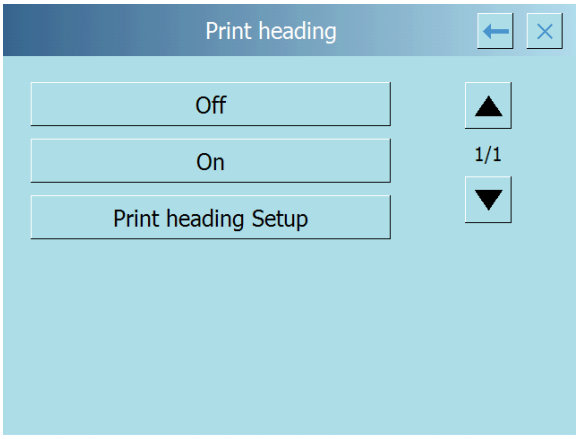


- **Stability**

Stability control prior to data transfer

Off: deactivated

On: activated



- **Header**

As headline you can set 4 lines containing 40 characters each.

Off: printout headline deactivated

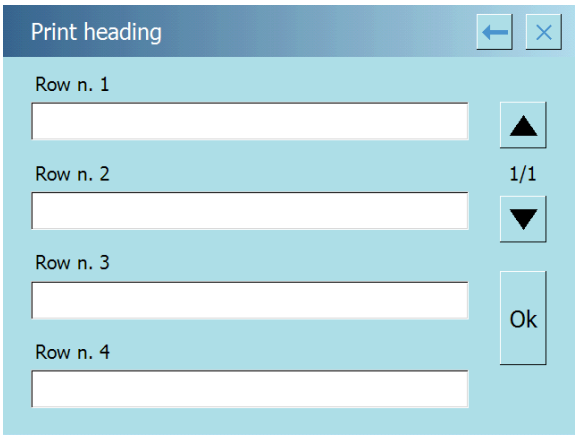
On: printout headline activated

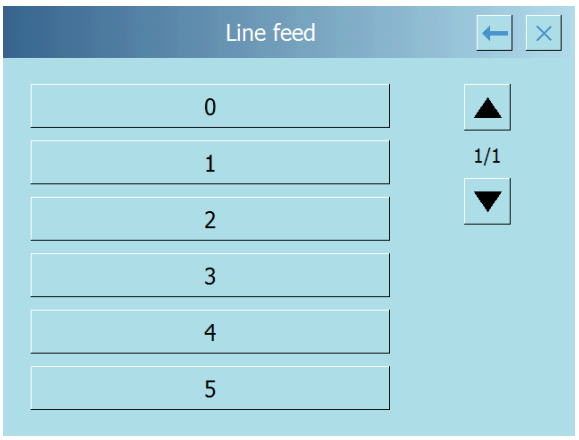
Printing headline:

Tap command button Print heading Setup.

Tap line and enter test of your choice in entry window (See chap. 9.3.1).

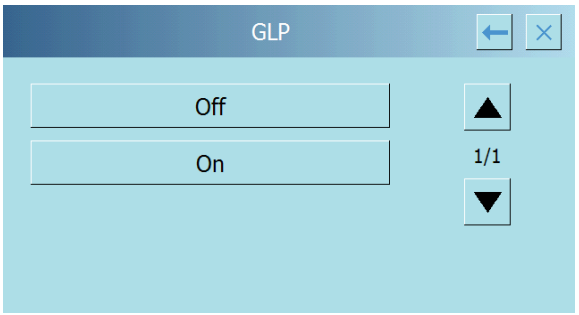
Confirm input by OK.





- **Line feed at the end of printout**

Selectable 0 – 5



- **GLP**

For setting GLP log see chap. 12.1

Off: GLP printout disabled

On: GLP printout enabled

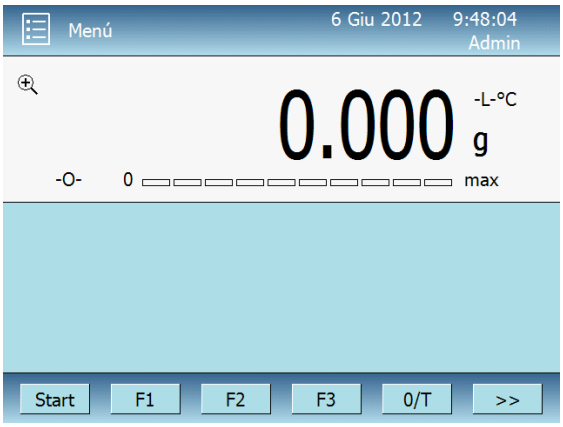
English

10 Drying parameters

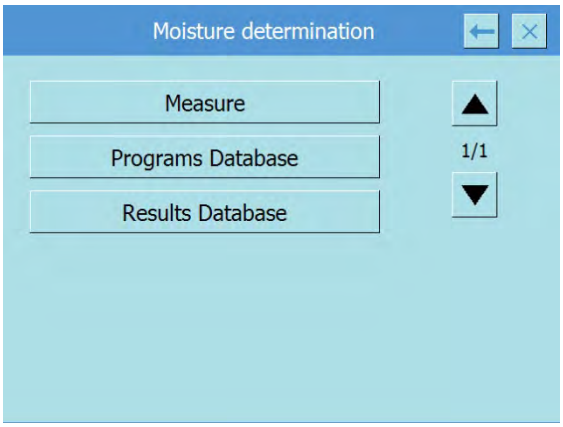
The optimal drying parameters (drying temperature, duration) depend on the kind and size of the sample and the required accuracy of the measured result. Exact parameters can only be determined experimentally.
For real-life examples please refer to our application manual by going to our KERN Homepage (www.kern-sohn.com).

The instrument provides an option that allows you to set drying parameters manually according to sample or to load a suitable drying program with the required drying parameters from the database.

10.1 Setting drying parameters manually



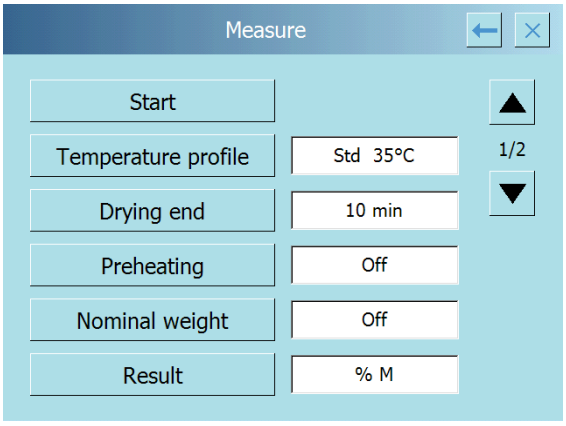
To call the menu, tap the Start command button.

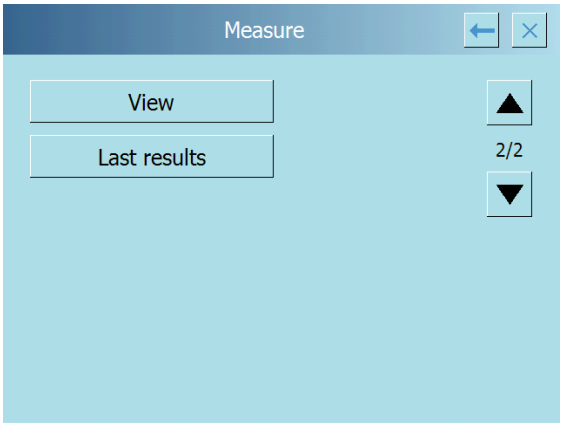


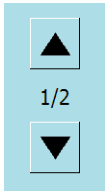
Then tap the Measure command button.

The list of drying parameters will appear.

- Heating profile
- Turn off criterion
- Preheat
- Start weight
- Result display
- Preview list of set drying parameters
- List of measured results







Display of available pages

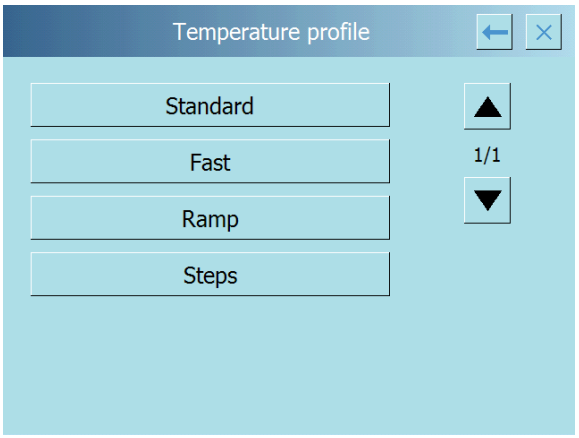
Use cursor ▲▼ to scroll up and down

Back to previous view  Exit menu

10.1.1 Setting a heating profile

This function offers various heating profiles that provide optimal matching of drying features to the sample in use.

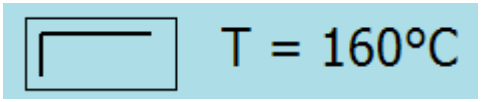
Tap command button Temperature profile on page 1.



The available heating profiles are shown:

- Standard drying
- Forced drying
- Gentle drying
- Step-by-step drying

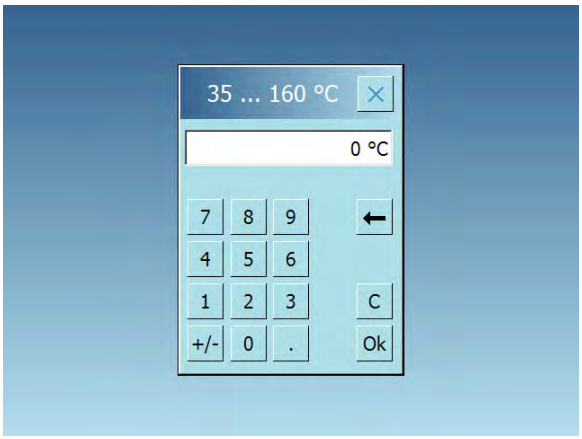
10.1.1.1 Standard drying



Display pictogram during drying

This heating profile is suitable for most samples. The sample is heated to the set drying temperature,
selectable 35°C -160°C

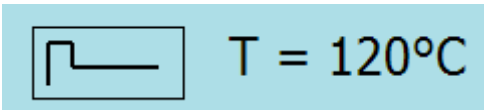
Tap command button Standard.



The numeric entry windows will appear. Enter required drying temperature, selectable 35°C - 160°C.

Import entry by tapping OK or tap ✕ to cancel. Display returns to previous screen.

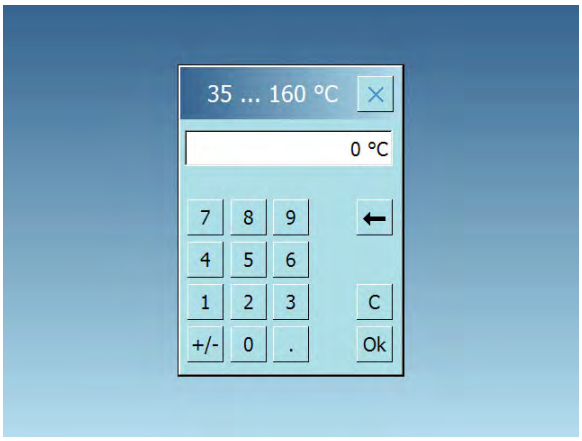
10.1.1.2 Forced drying



Display pictogram during drying

This heating profile is suitable for samples with high moisture content (such as liquids). The temperature will be exceeded for a short time after the start so as to compensate for latent heat and to accelerate the drying process.
Then the temperature is controlled down to the set value.

Tap command button Fast.

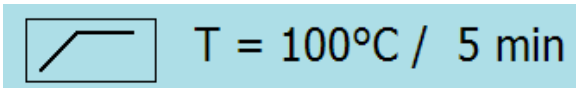


The numeric entry windows will appear. Enter required drying temperature, selectable 35°C – 160°C.

Import entry by tapping OK or tap × to cancel. Display returns to previous screen.

English

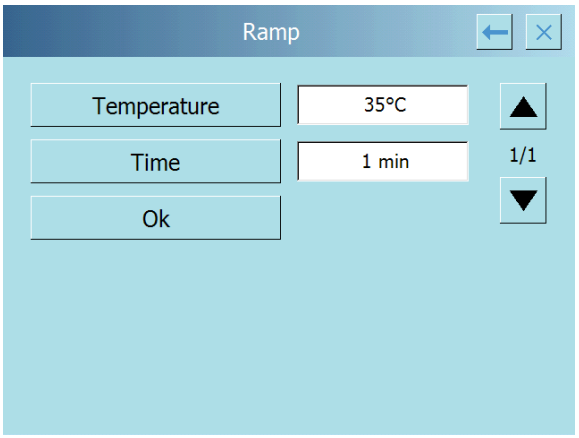
10.1.1.3 Gentle drying



Display pictogram during drying

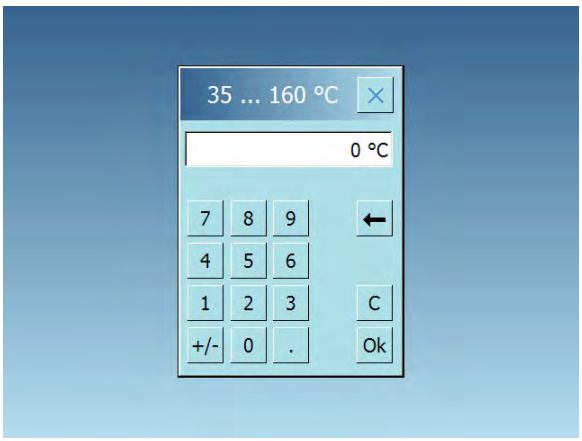
This heating profile is suitable for careful drying of substances that tend to form skin (such as substances containing sugar or highly volatile substances). Skin formation affects the evaporation of the enclosed liquid. The temperature keeps rising and reaches the selected drying temperature only after the so-called ramp has passed. Ramp, meaning the time passing between the start of drying and reaching the drying temperature is selectable.

Tap command button Ramp.



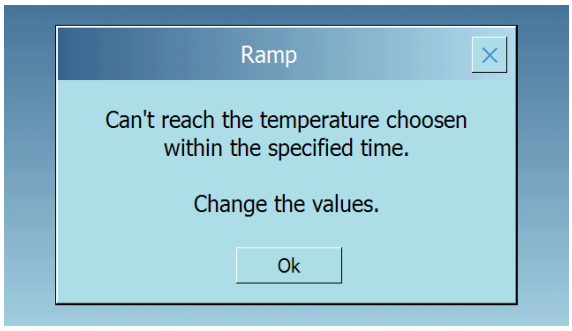
Selectable parameters:

- Drying temperature: 35°C -160°C
- Ramp-up period: 1 – 15 minutes



Tap the command button accordingly and the numeric entry window will appear. Enter required drying temperature or ramp-up period.

Import entry by tapping OK or tap ✕ to cancel. Display returns to previous screen.



Note:

If it is impossible to reach the drying temperature in the set ramp-up period, you will see an error message. Increase ramp-up period.

10.1.1.4 Step-by-step drying

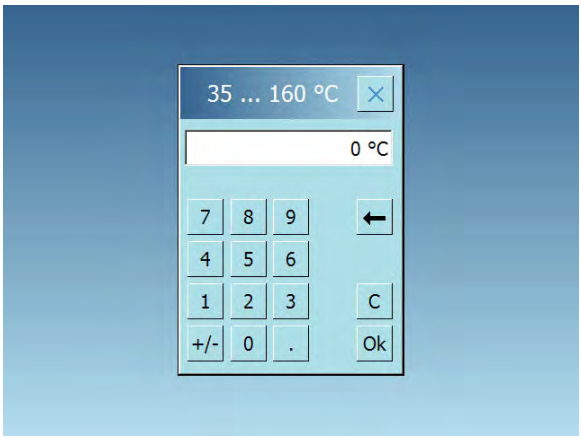
Display pictogram during drying

This heating profile is suitable for drying substances that are composed of several components (such as essential oils) that volatilize at different temperatures or for substances that show special behaviour during heating. Selectable 3 levels Drying temperatures and duration are freely selectable for each level. Measurement on the last level is stopped by the cut-off criterion.

Tap command button Steps.

The current settings of each stage are shown in the white fields.

To change, tap blue command button.



The numeric entry windows will appear. Enter required level temperature / duration. Selectable parameters:

- Level temperature: 35°C -160°C
- Time (level 1 and 2): 1 – 99 minutes

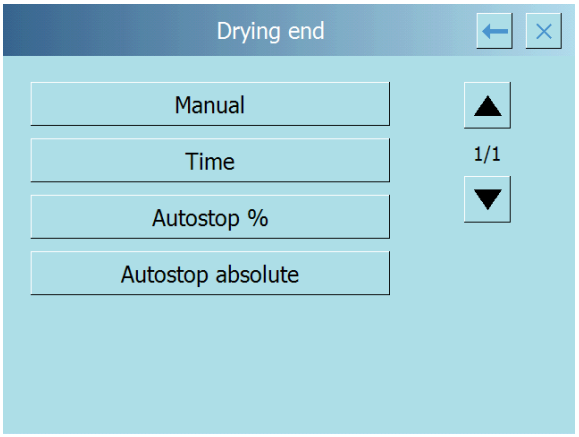
Import entry by tapping OK or tap ✕ to cancel. Display returns to previous screen.

English

10.1.2 Shutoff criterion

The point of quitting for drying process is determined by a cut-off criterion. Cut-off criteria ensure that measurements always take place under the same conditions and provide for repeatable measurements.

Tap command button Drying end on page 1.

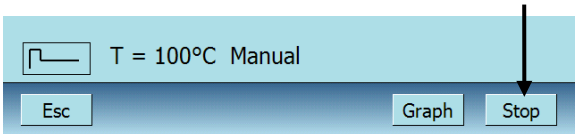


The available cut-off criteria are shown:

- Manual
- Time
- Autostop %
- Autostop absolute

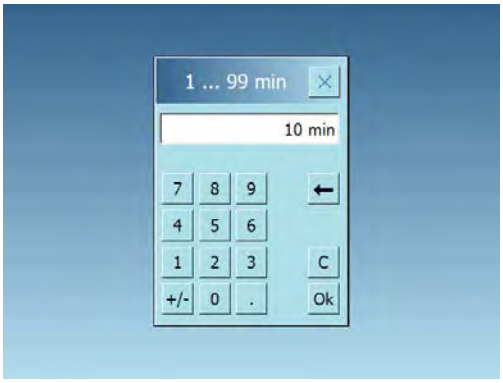
Note:

Irrespective of the selected setting, however, you can also quit measurement at any time by tapping the command button Stop.



- **Manual**

Measurement is cut-off by tapping the command button Stop.



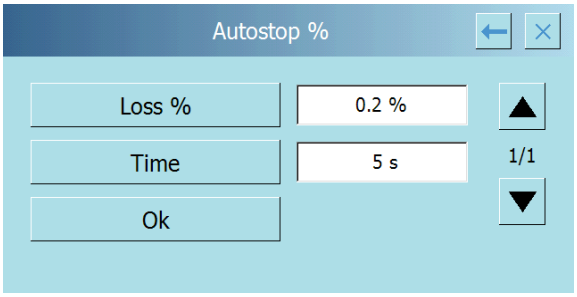
- **Time**

Measurement continues until the set drying time has passed.

Tap the command button accordingly and the numeric entry window will appear. Enter the required drying time, selectable 1 -99 minutes.

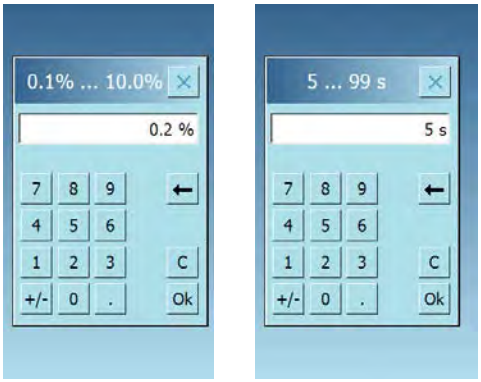
Import entry by tapping OK or tap ✕ to cancel. Display returns to previous screen.

English



- **Autostop %**

This cut-off criterion is based on loss of weight (% moisture) per unit of time. Measurement will be cut off when the loss of weight per unit of time drops below the set value; both values are freely selectable. [% / sec].

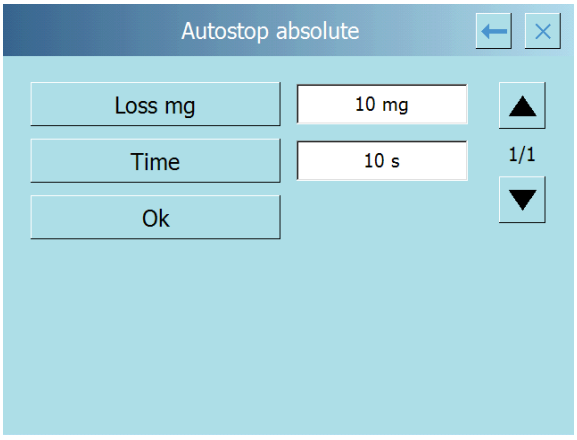


Tap the command button accordingly and the numeric entry window will appear. Enter loss of weight and unit of time.

Selectable parameters:

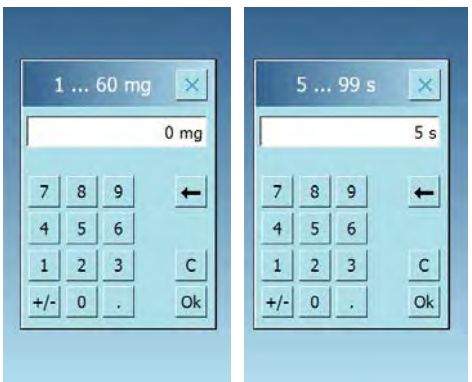
- Weight loss: 0.1%-10.0%
- Time unit: 1 – 99 minutes

Import entry by tapping OK or tap ✕ to cancel. Display returns to previous screen.



- **Auto stop absolute**

This cut-off criterion is based on loss of weight (mg) per unit of time. Measurement will be cut off when the loss of weight per unit of time drops below the set value, both values freely selectable [mg / sec].



Tap the command button accordingly and the numeric entry window will appear. Enter loss of weight and unit of time.

Selectable parameters:

- Weight loss: 1 mg -60 mg
- Time unit: 1 – 99 minutes

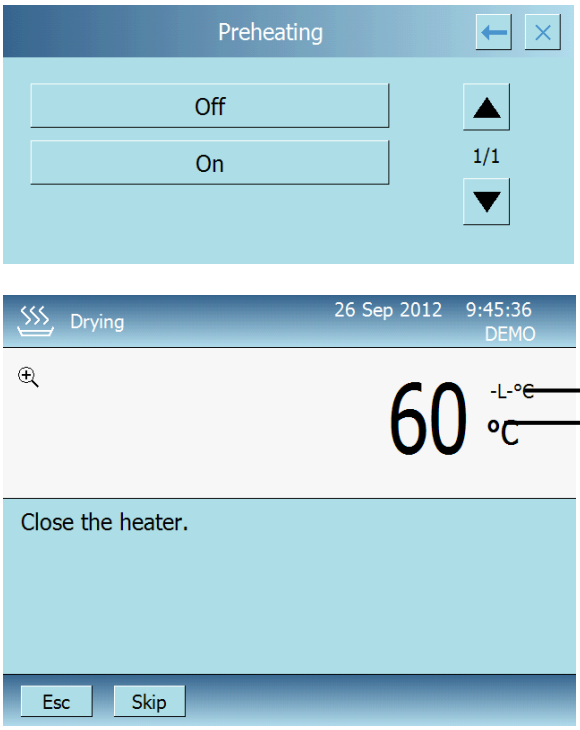
Import entry by tapping OK or tap ✕ to cancel. Display returns to previous screen.

English

10.1.3 Preheating (prior to initial weighing)

If required, you can enable the “Preheat” function used to preheat the sample chamber before the actual measurement.

Tap command button Preheating on page 1.



Off Function deactivated

On Function activated

To start measurement, tap the command button Start. The instrument begins to heat up to the set drying temperature before the measurement process starts.

Current temperature (“L” appears for temperatures < 35°C).

Set the drying temperature.

Close the sample chamber and preheating will start.

You can tap the command button Skip to stop preheating during the preheating phase and, after having determined the initial weight of the sample, to start measurement.

Tapping the command button Esc will stop measurement including preheating.

Preheating is usually not required for standard applications.

10.1.4 Weighing assistance

The auxiliary weighing device facilitates easy adjustment of a sample's initial weight to the set value with adjustable tolerance range. This is particularly useful if you always process samples of the same weight. That way the reproducibility of measured results is increased. Repeatability will be increased if all the samples' initial weight is determined within the tolerance.

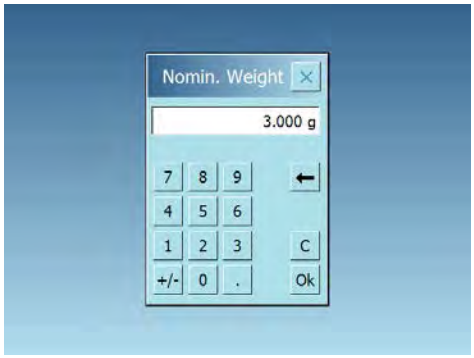
Tap the command button Nominal weight to enable the auxiliary weighing device.

Off Auxiliary weighing device disabled

Nomin. weight Nominal weight

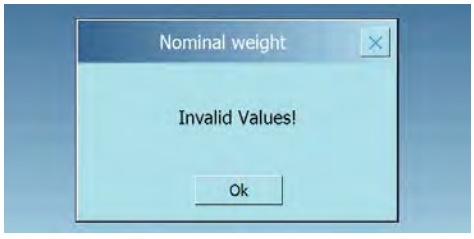
Min. weight Lower weight limit

Max. weigt. Upper weight limit



Tap the command button accordingly and the numeric entry window will appear. Enter desired weight and tolerances.

Import entry by tapping OK; the instrument is checking the entries.



Invalid entries (such as lower lower weight limit >upper lower weight limit) result in an error message.

Repeat correct entry.

Note:

Minimum initial weight > 0.500 g. Initial weight < 0.500 g results in an error message.

English

10.1.5 Result display

This function is used to determine which unit is to be used for the display and printout of measured results.

Calculation:

Unit	Calculation	Display
[%] moisture 0 – 100%	$\frac{W - D}{W} = 100\%$	M
[%] dry mass 100 – 0%	$\frac{D}{W} \times 100\%$	%R
ATRO* moisture 0 – 999%	$\frac{W}{D} \times 100\%$	A

Explanation of symbols

W: Starting weight (weight at start of measuring)

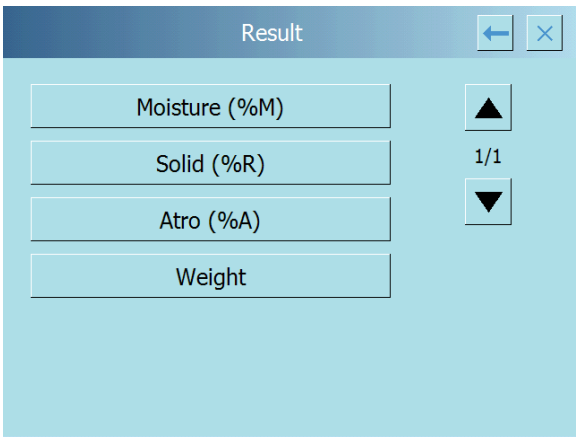
D: Residual weight (weight value at the end of measurement)

M: Weight loss = starting weight – residual weight

*ATRO is a unit which is exclusively used in the timber industry.
The timber humidity (ATRO) means the percentage of water contained in the timber, indicated in percent of the mass of the water-free timber.
It is calculated from the difference between fresh weight (SG) and dry weight (RG).

Settings:

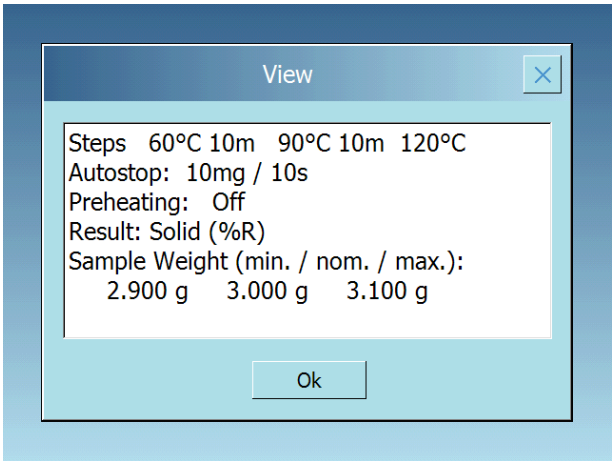
Tap command button Result.



Selectable display modes:
- Moisture (%M)
- Solid (%R)
- Atro (%A)
- Weight (g)

Note:
During and after measurement you can change over to the available units, see chap. 11.

10.1.6 Displaying currently set drying parameters



Tap command button View and the currently set drying parameters will appear.

Tap OK and the display will return to the previous screen.

10.1.7 Displaying the last measured result

Tap the command button Last results and the last measured result will appear.

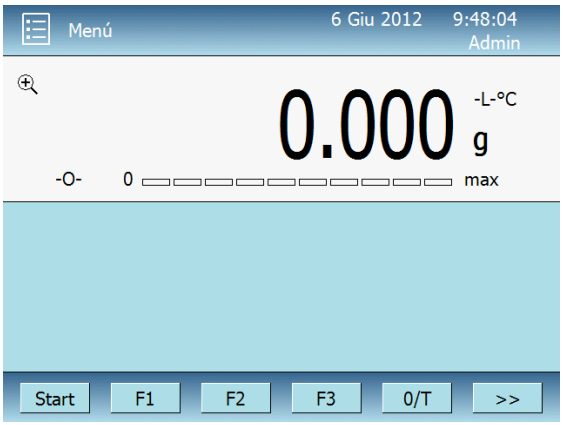
Tap Esc and the display will return to the previous screen.

English

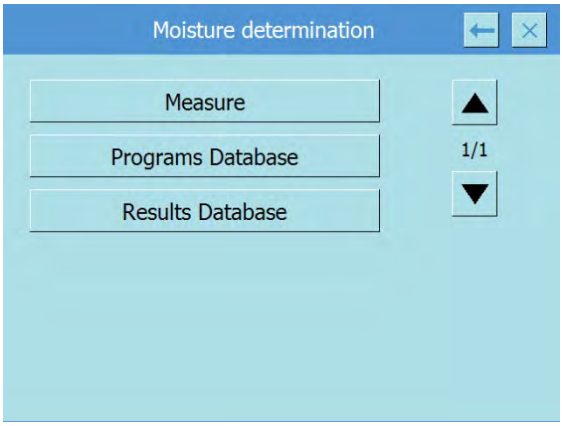
10.2 Setting drying parameters by using program database

This function allows you to save new drying programs and to change or delete existing ones.
For exporting or importing incl. user profile see chap. 12.2 “Database Management → THB-database”.
The memory is enough for 300 drying programs.

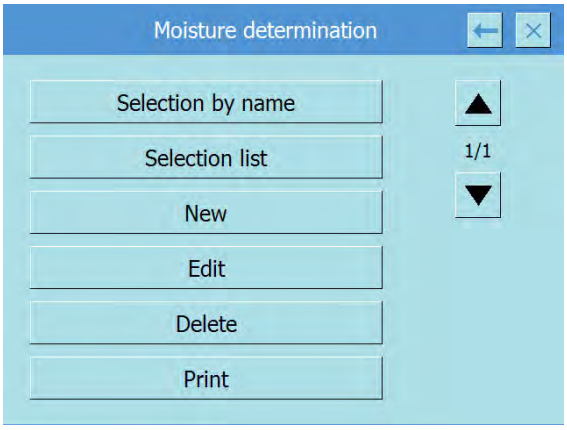
A drying program contains all the settings required for measuring the moisture content of a certain sample. You can call it by tapping the command button “program database” or by pressing the short-cut key (F1 – F3) whereupon the moisture meter will immediately start working according to the saved settings.



To call the menu, tap the command button Start.



Tap command button Programs Database.

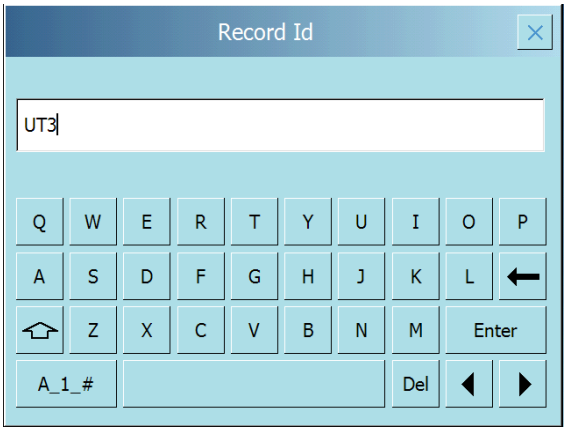


Your selection will be shown.

The following chapter describes how to create a new drying program.

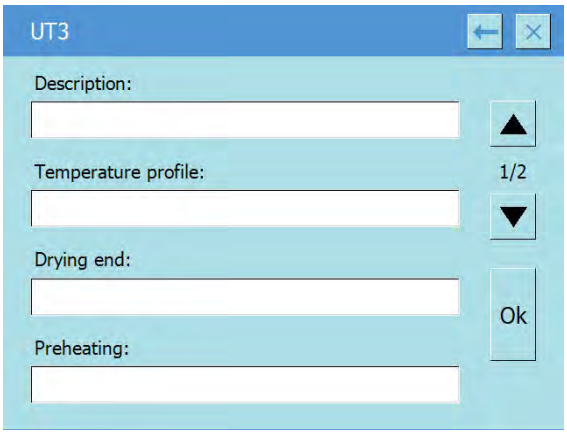
Carry out Change, Delete or Print the same way and follow the instructions shown on the screen.

10.2.1 Saving a new drying program

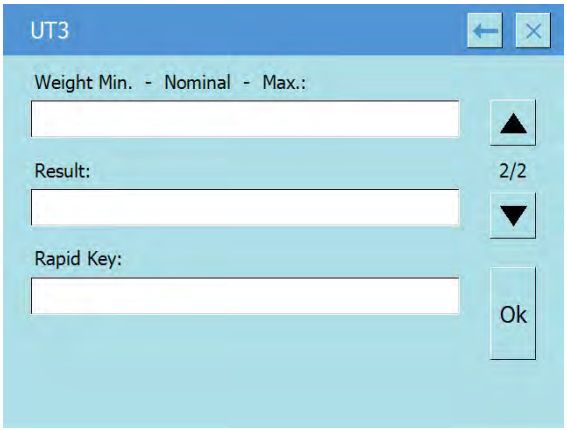


Tap command button New and the entry window will appear (For entry see chap. 9.3.1). Enter name for the new drying program.

Confirm entry by tapping Enter and the menu for entering drying parameters will appear.

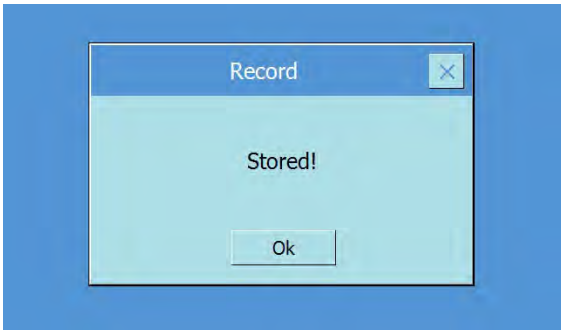


- Name (For entry see chap. 9.3.1)
- For heating profile, see chap. 10.1.1
- For cut-off criterion see chap. 10.1.2
- For preheating see chap. 10.1.3
- For auxiliary weighing device see chap. 10.1.4
- For display of results see chap. 10.1.5
- Allocate short-cut key, selectable off, F1, F2 or F3



To enter, tap on relevant white field.

Import entry by tapping OK.



Confirm “Save” query by OK.

English

11 Carrying Out Measurement

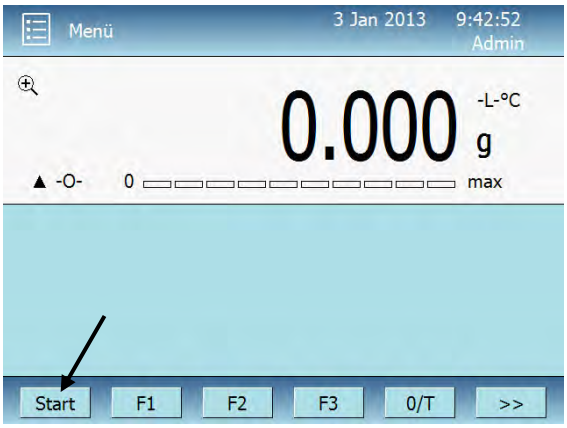
First set the drying parameters as described in chap. 10 during initial start-up.

(1) Start-up

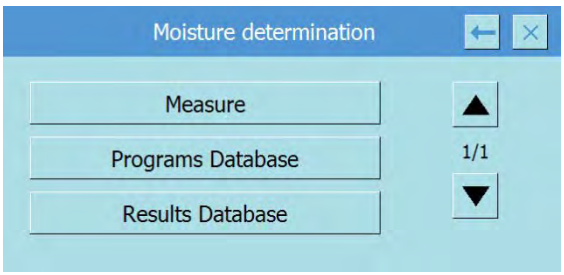
⇨ Turn on moisture meter. In order to obtain exact results, the instrument must have reached its operating temperature (see warm-up time chap. 1). For this warm-up time the instrument must be connected to the power supply.

(2) Selecting a drying program

Description	Command button
1. Set the drying parameters as described in chap. 10.1.	Measure
2. Load a drying program suitable for the sample from the memory, see chap. 10.2	Programs Database
3. Tap short-cut key (For allocation see chap. 10.2.1).	F1 F2 F3

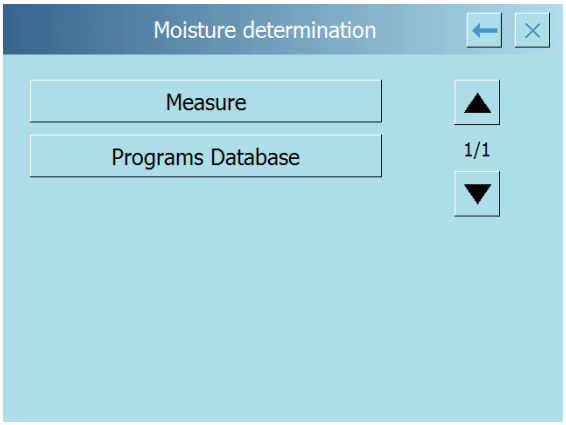


⇨ Tap command button Start



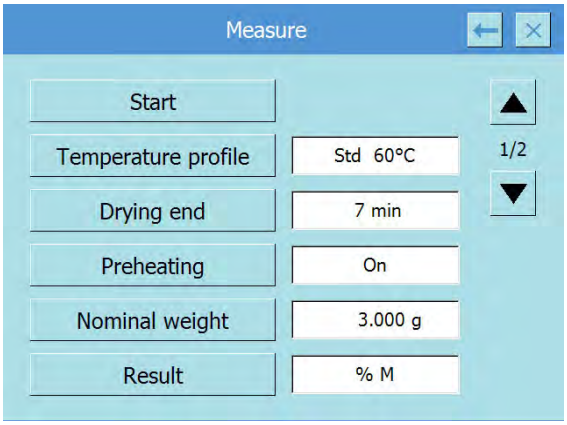
⇨ Next tap command button Measure or Programs Database.

1. Command button Measure



Tap command button Measure.

The currently set drying parameters (setting see chap. 10) will be shown on the white fields.

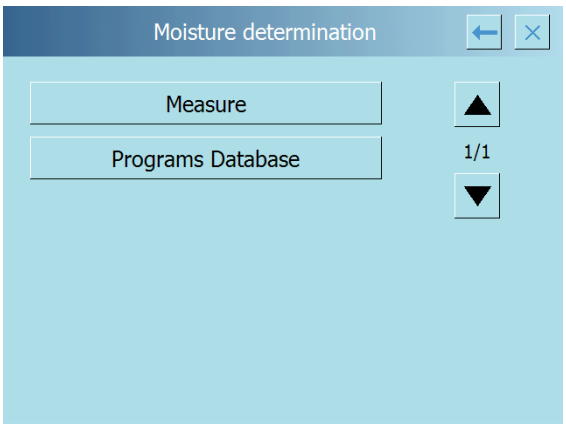


Tap command button Start and measurement will start based on the displayed drying parameters.

English

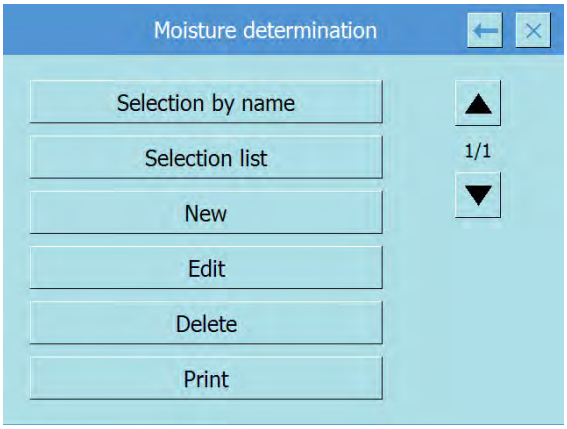
2. Command button

Programs Database



Tap command button Programs Database .

English



Loading drying program from the memory

Command button

Tap Selection by name

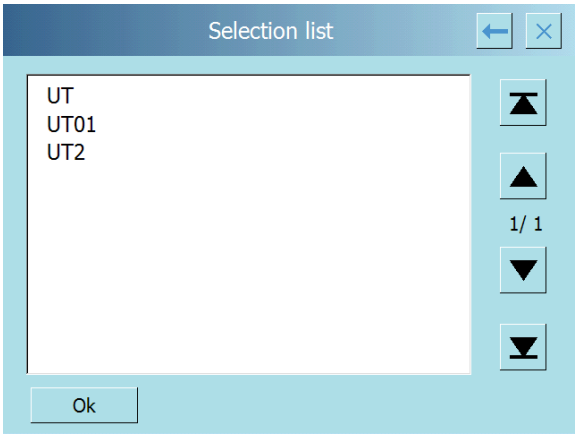
or

Selection list .

Either Selection by name

Enter the „“name” in the entry window and confirm by Enter and the drying parameters will appear.

Or Selection list



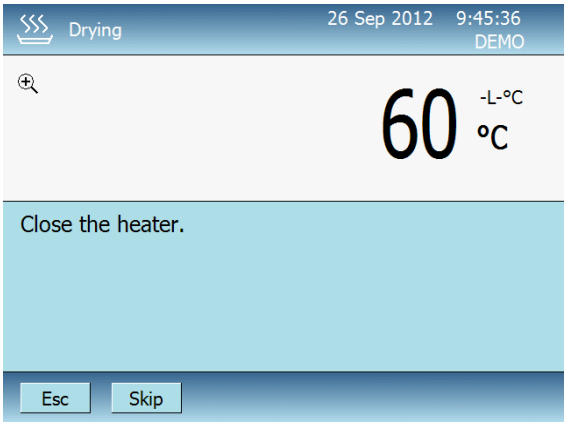
Select drying program from list.

Confirm by OK and the drying parameters will be shown.

Tap OK to start measurement and the display for determining the initial weight for the sample will appear.

English

(3) Carrying Out Measurement

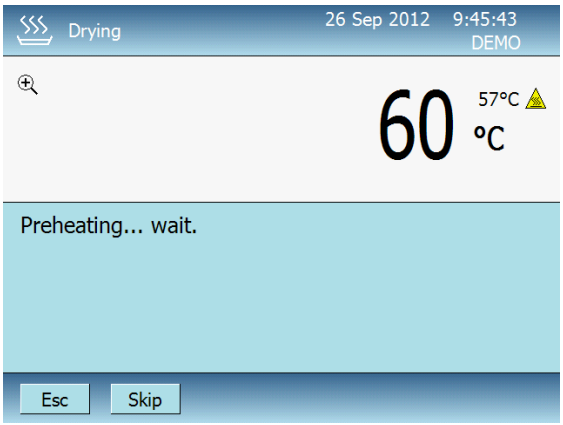


Step 1: Preheat

This will be started if preheating level is enabled.

When the preheating level is disabled, measurement will start at step 2.

➢ A prompt appears asking you to close the sample chamber.

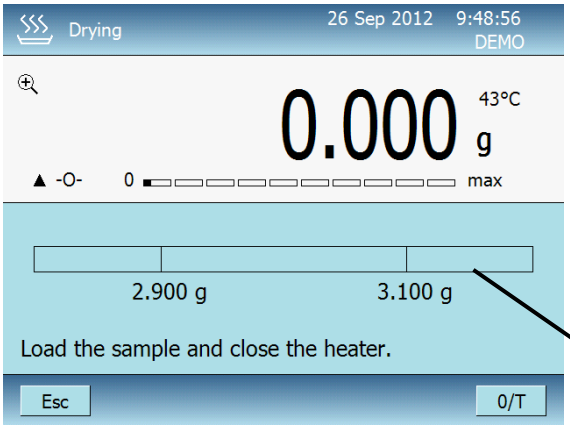


Close the sample chamber and preheating will start.

A warning symbol will appear for temperatures > 50°C.

You can tap the command button Skip to stop preheating during the preheating phase and, after having determined the initial weight of the sample, to start measurement.

Tapping the command button Esc will stop measurement including preheating.



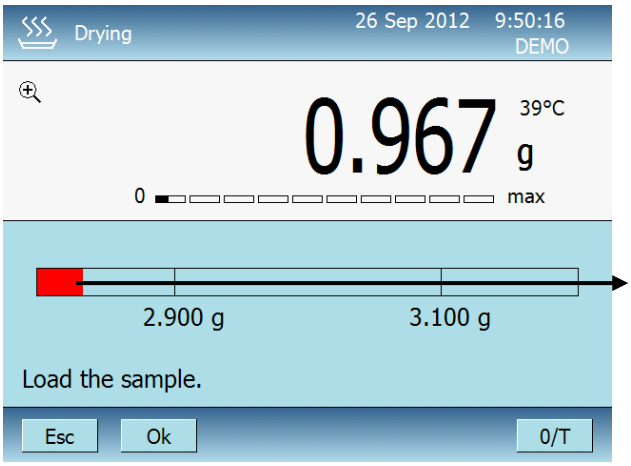
Step 2: Insert sample dish

➢ A prompt asks you to insert an empty sample tray and to tare.

Put sample tray on the sample tray holder. Then put it inside the sample chamber. Always work with a removal aid as this will enable safe working and prevent burns.

Weigh in sample.

With the auxiliary weighing device enabled, determine the initial weight for desired weight ±tolerance as described below.

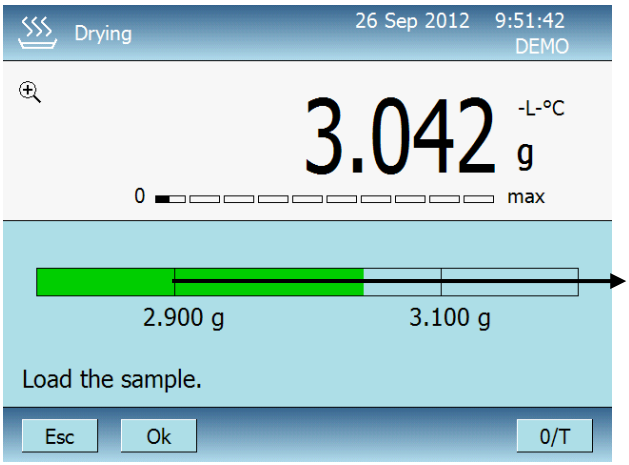


Working with the help of an auxiliary weighing device:

The bar graph display moves from the left to the right and proceeds equally to the weight loaded onto the weighing balance.

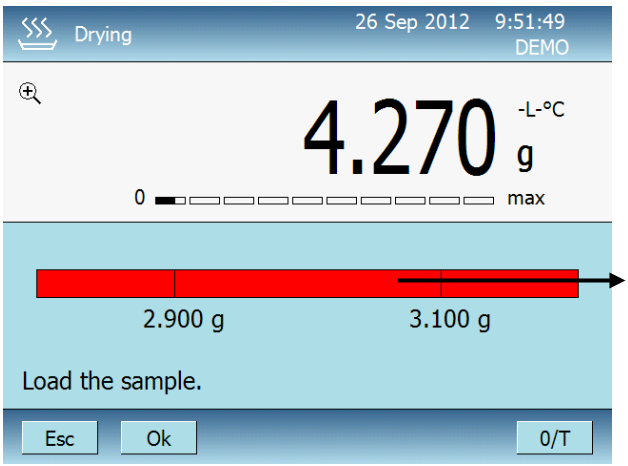
red

Initial weight < lower weight limit



green

Desired weight within weight limits



red

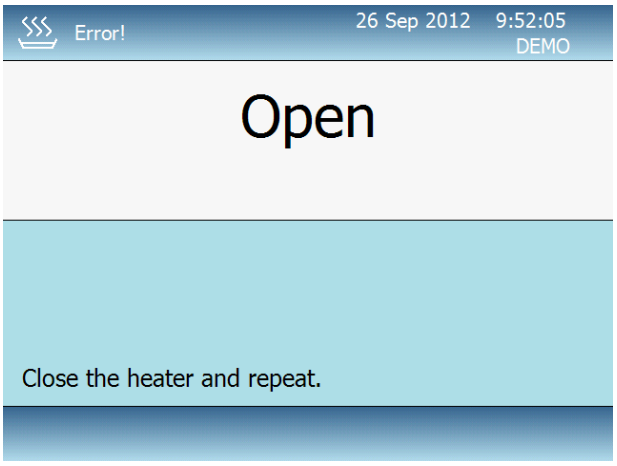
Initial weight > upper weight limit

Step 3: Start measurement

Measurement will start according to the “Start Criterion” setting, see chap. 9.7.

Automatic	Measurement will start automatically as soon as sample chamber has been closed.
Manual	Measurements will start after you have tapped the command button OK.

English



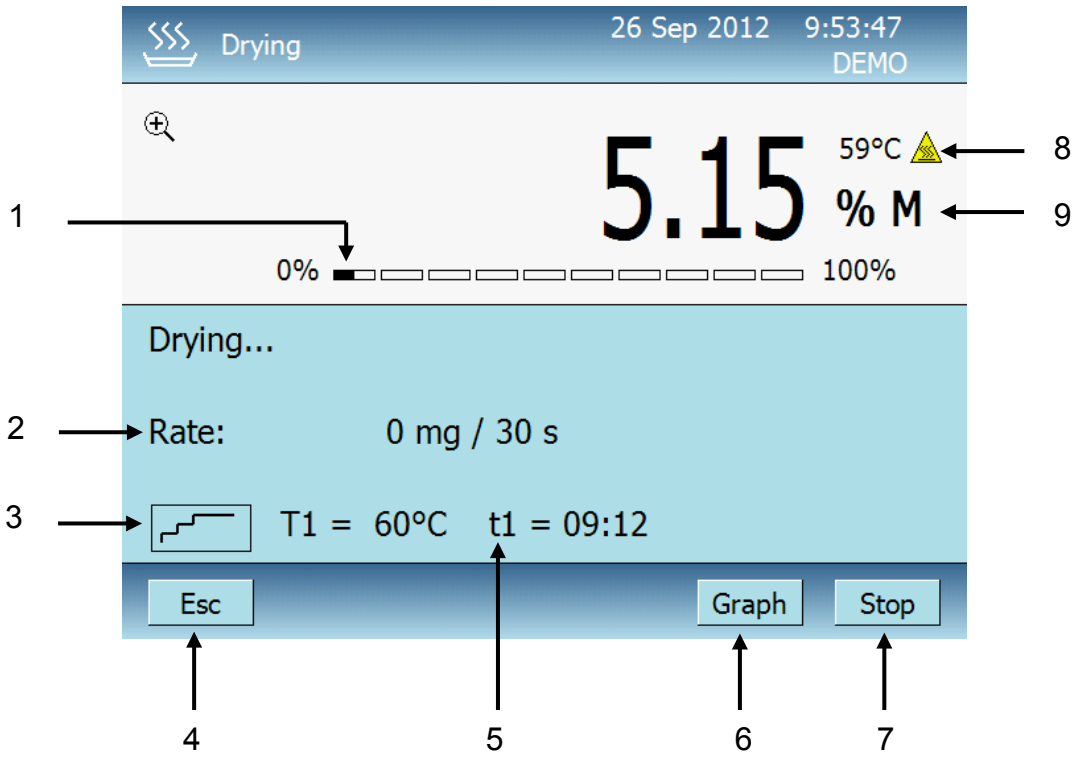
If the sample chamber is open you will be prompted to close the sample chamber.

Close the sample chamber and tap the OK button again.

Measurement will start according to the “Start Delay” and “Stability Control” settings, see chap. 9.7.

English

Step 4: Display during drying



1. Bar graph display “% loss of moisture”
2. Current loss of weight / unit of time
3. Heating profile
4. Command button “Cancel measurement / back to previous screen”
5. Shutoff criterion
6. Command button “Show drying curve”
7. Command button “Cancel measurement“
8. Current temperature
9. Display of results, tap to change over

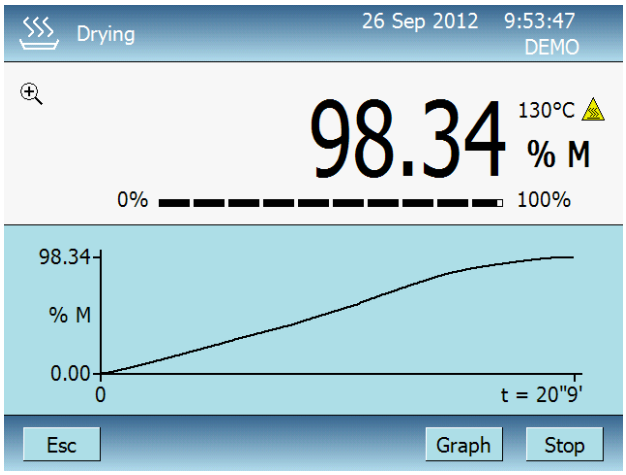
English

Step 5: Switch-over display

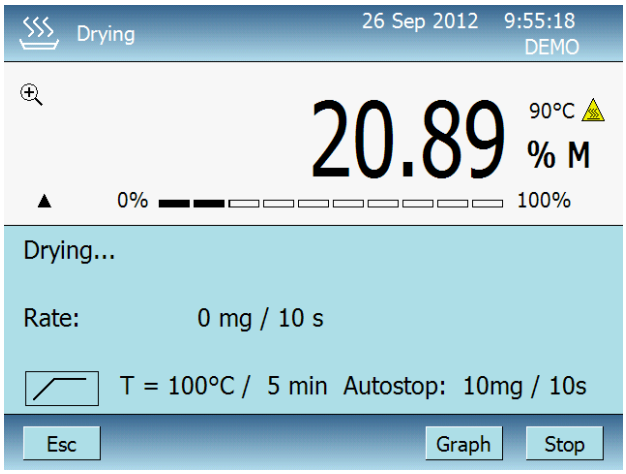
1. Display drying curve

The graph for the drying curve shows the progress of drying in real time.

⇨ To display the drying curve, tap the “Graph” button.

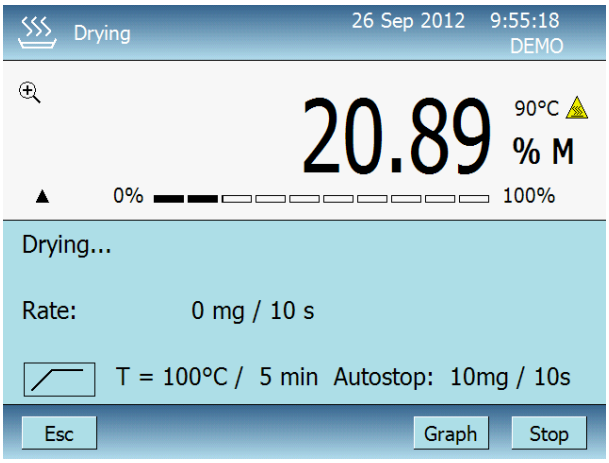


⇨ Back to previous display, tap the “Graph” button again.

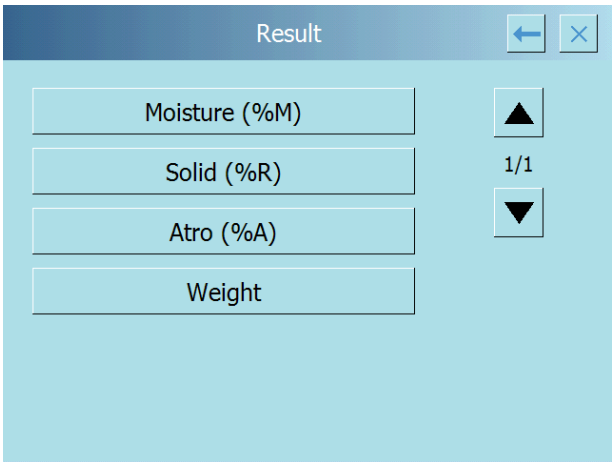


English

2. Switch over display of result



Tap symbol to change the unit



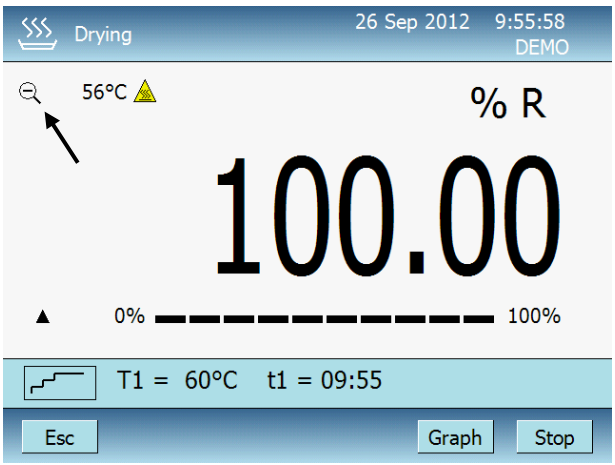
Tap required unit,
see chap. 10.1.5.

3. Zoom function

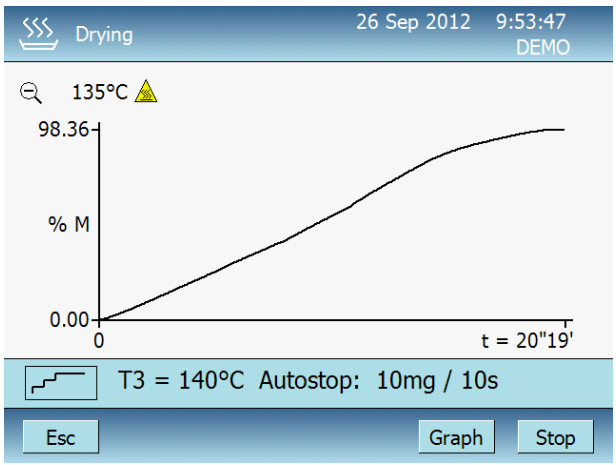
Zoom out

Zoom in

Zoomed out measured value display



Zoomed out drying curve



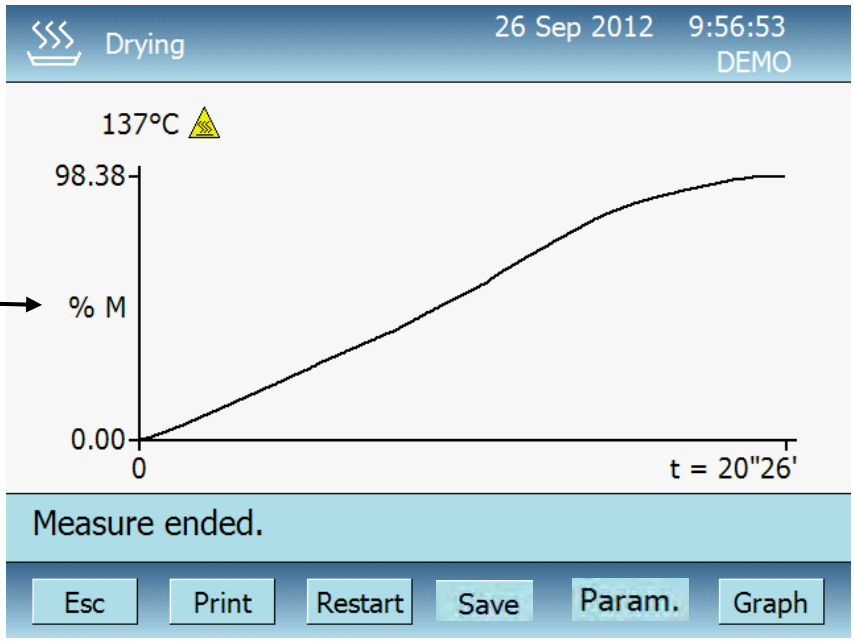
English

Step 6: End of measurement, show/print measured results

⇨ When drying is complete you will hear an acoustic signal (For menu setting acoustic signal “on” see chap. 9.7) and the heating will be turned off.

Selectable parameters:

- Moisture (%M)
- Solid (%R)
- Atro (%A)
- Weight (g)



English

When an optional printer is connected, the measurement log will be edited independently on the settings in the menu, see chap. 9.8

Note:

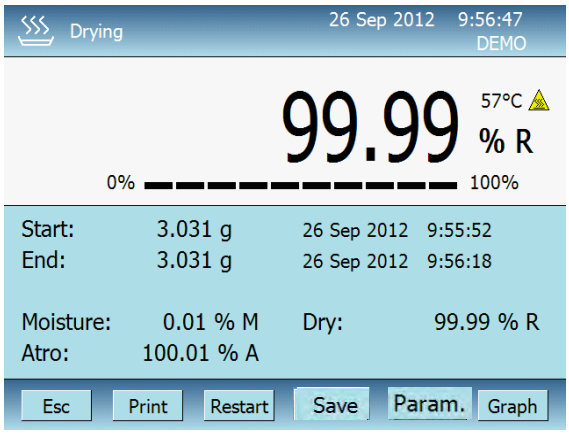
Drying curves cannot be printed by a standard printer.

Printout example (KERN YKB-01N)

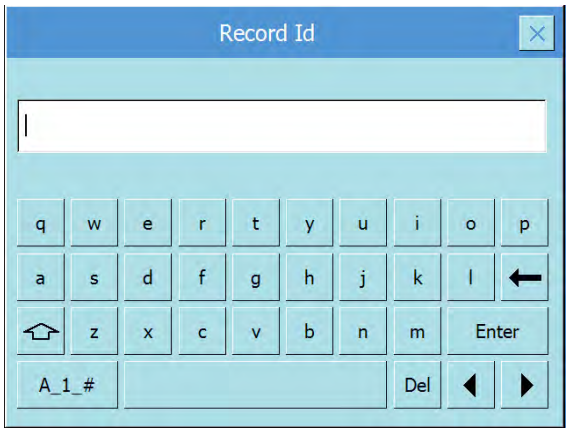
Moisture analyzer KERN		For headline see chap. 9.8
10 Dec 2012 9:04:30		Date/time
Balance ID:		For GLP parameter see chap. 12.1
User ID:		
Project ID:		
Standard 100‘C		Heating profile
Time 7 min		Shutoff criterion
Preheating:	Off	Preheat
W min.	2900 g	Lower weight limit
W nom.	30000 g	Nominal weight
W Max.	3100 g	Upper weight limit
10 Dec 2012 9:04:30		
W Start	3.019 g	Start weight
10 Dec 2012 9:04:30		
W End	2.994 g	Residual weight
Moisture	0.82 %M	% moisture
Signature:		Signature

English

Step 7: Store measurement results

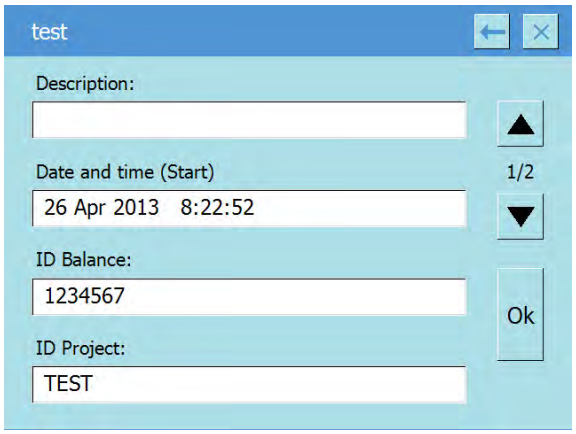


Touch the Save button, the input window appears.



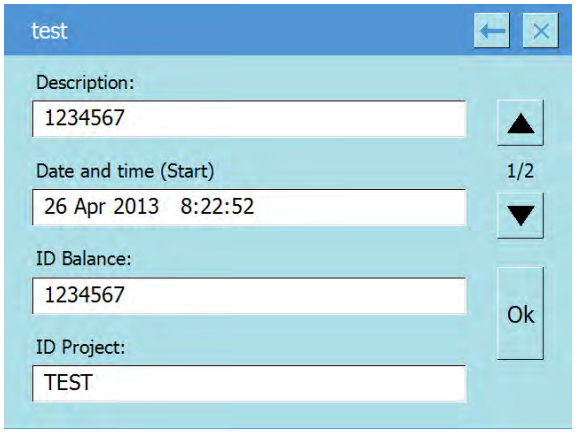
Enter name of a memory location (input see chapter 9.3.1).

Confirm input by Enter .



The GLP parameters are displayed.
For input „description" touch the white field.

Confirm input by Enter .



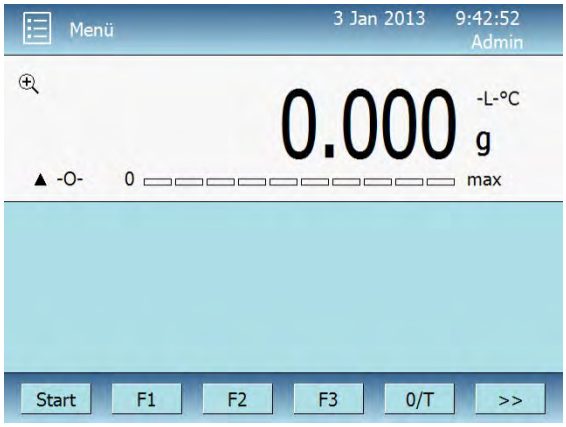
Take over input by OK .

Confirm query „Stored“ by OK.

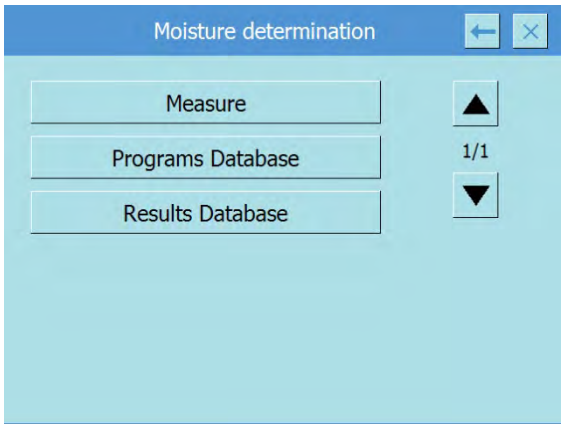
English

12 Call up / edit / delete measurement results

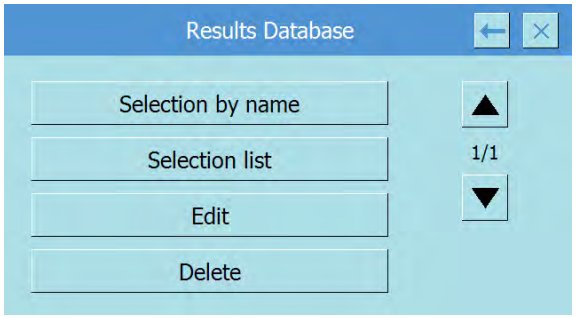
The instrument offers the possibility to store 300 measurement results or to edit or to delete existing results.



To call up the menu touch the Start button.



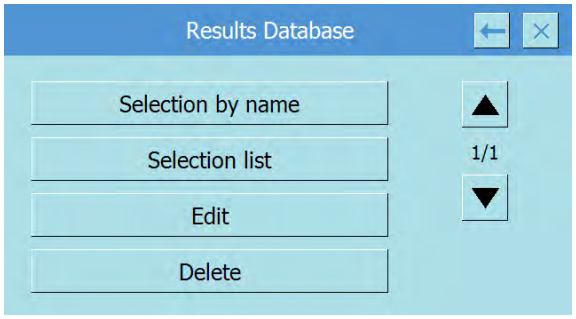
Touch the Results Database button.



The selection is displayed.

English

12.1 Call up the measurement results



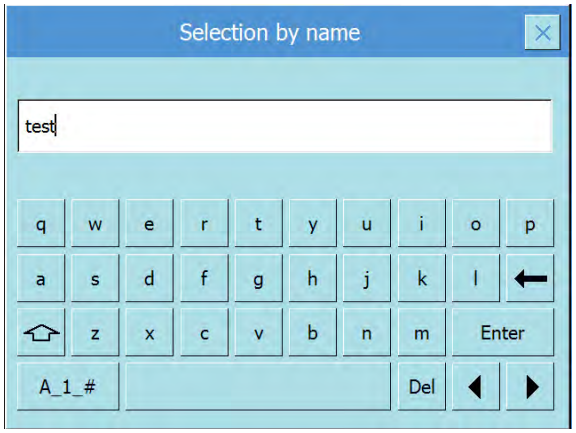
To load the measurement results from the memory, touch the

Selection by name

or the

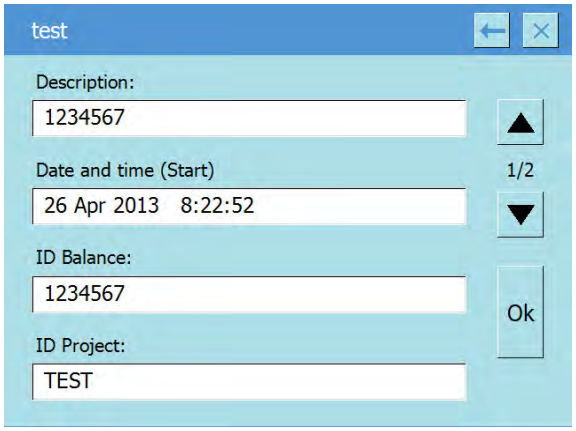
Selection list button.

Either Selection by name

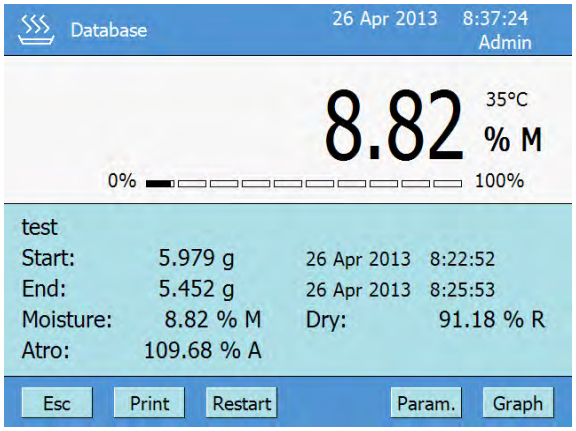


In the input window enter „designation memory location“ and confirm by Enter.

The stored measurement result will be called up.



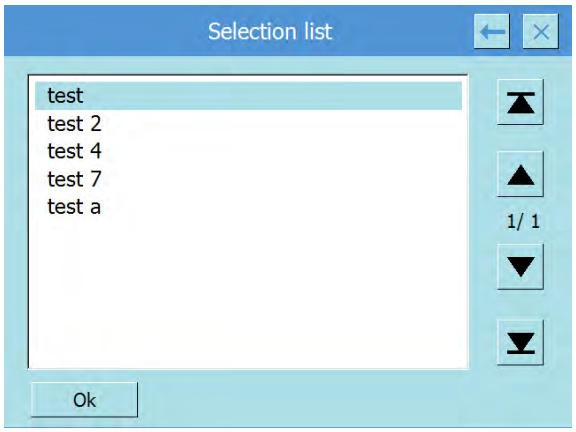
Touch the OK button, the measurement log will be displayed.



Details see chap. 11 / Step 6

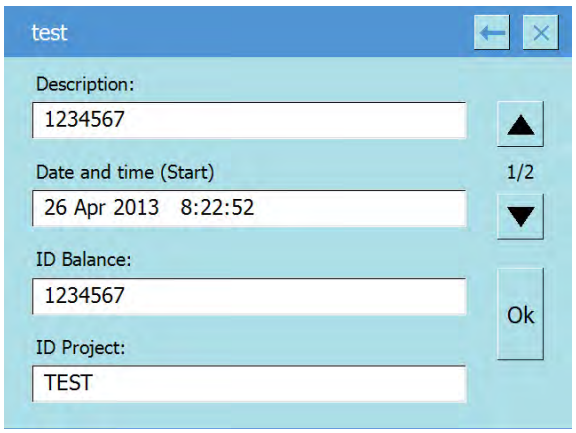
English

Or Selection list

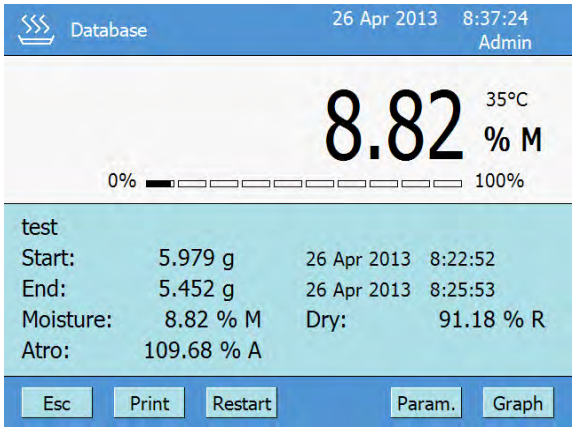


Touch the memory location name in the list and confirm by OK.

The stored measurement result will be called up.



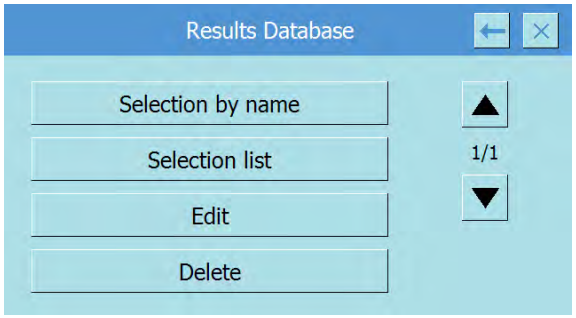
Touch the OK button, the measurement log will be displayed.



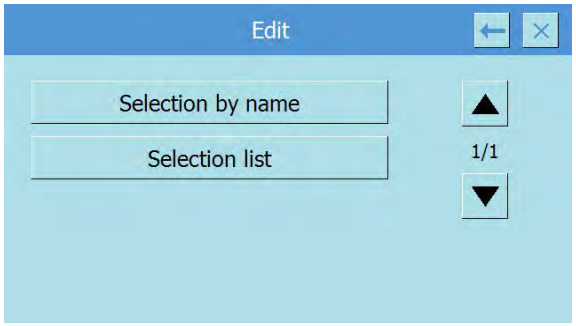
Details see chap. 11 / Step 6

English

12.2 Edit measurement results



Touch the Edit button.



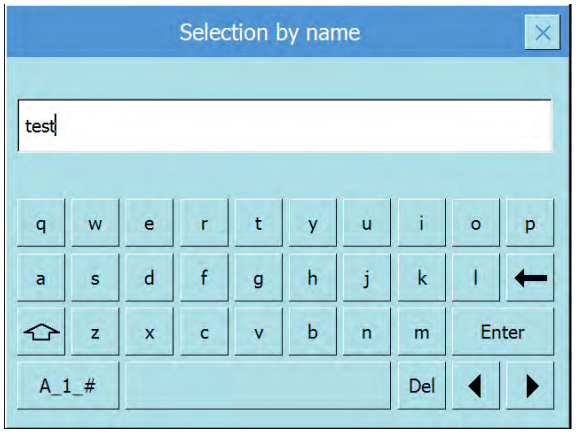
To load the measurement results from the memory, touch the

Selection by name

or the

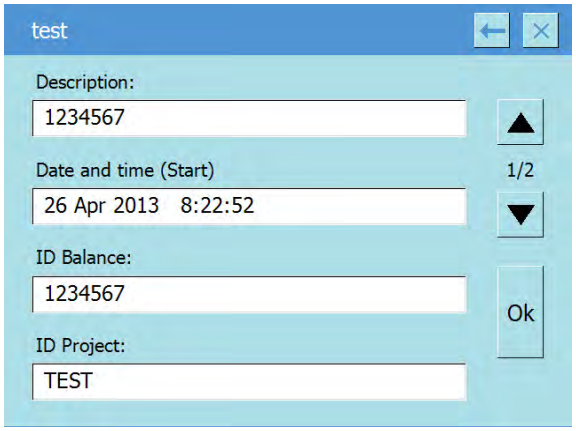
Selection list button.

Either Selection by name



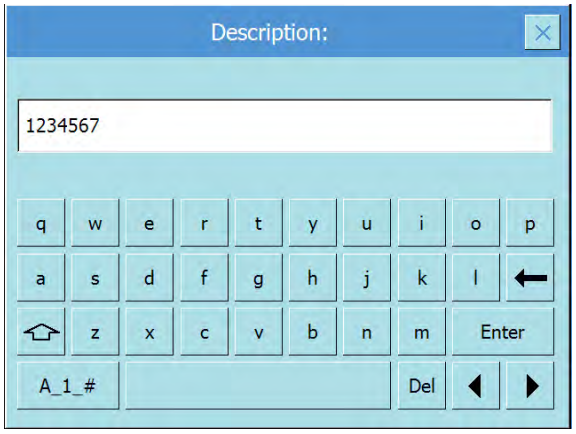
In the input window enter „designation memory location“ and confirm by Enter.

The stored measurement result will be called up.

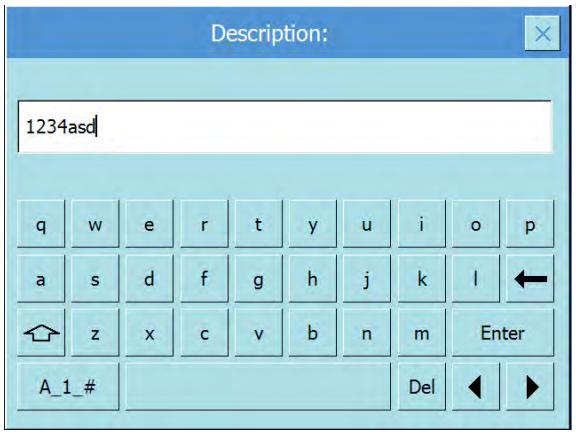


To edit, touch the white field „description".

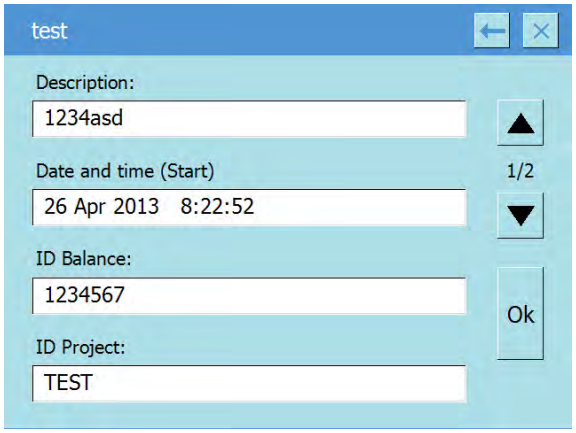
English



The input window will be displayed.



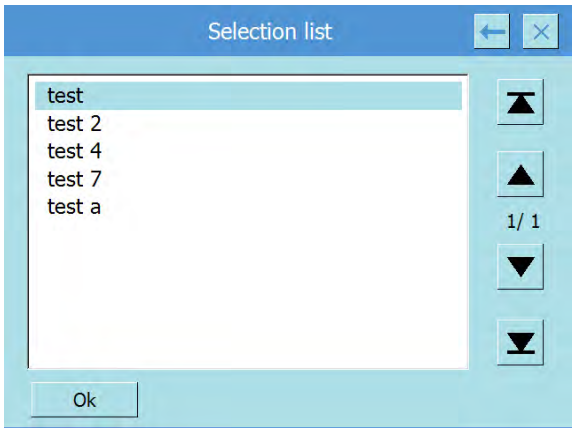
Confirm input by Enter .



Take over by OK.

Confirm query „Save“ by OK.

Or Selection list



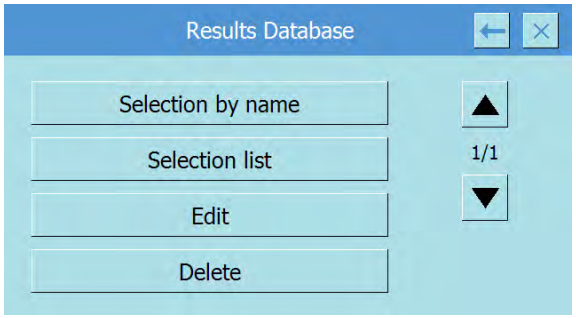
Touch memory location name in list and confirm by OK.

The stored measurement result will be called up.

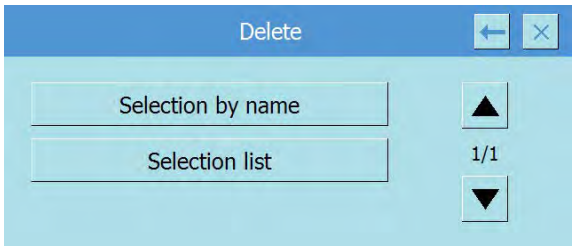
„Edit“ as described before at selection Selection by name.

English

12.3 Delete measurement results



Touch **Delete** button.



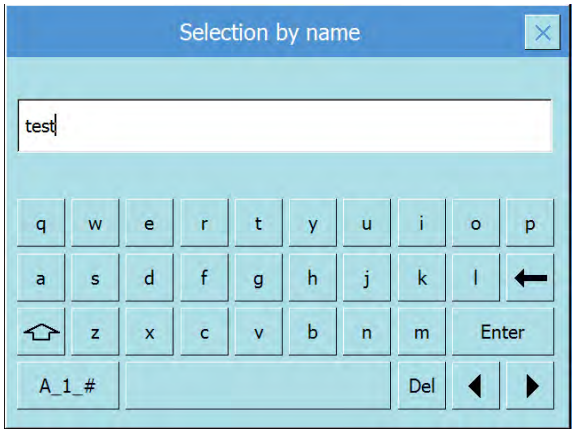
To load the measurement results from the memory, touch the

Selection by name

or

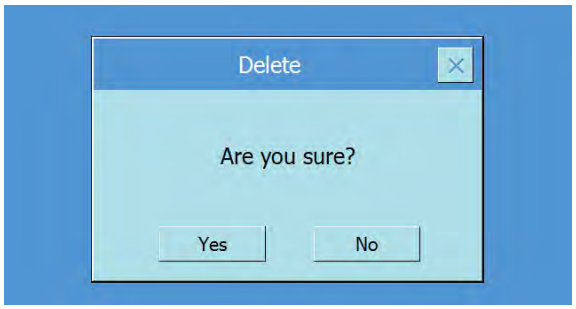
Selection list button.

Either **Selection by name**



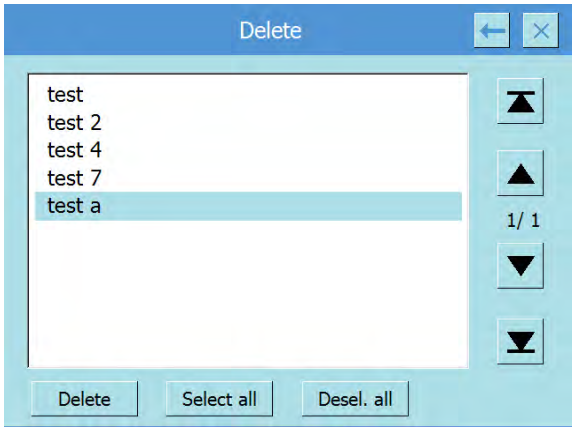
In the input window enter „designation memory location“ and confirm by **Enter**.

The stored measurement result will be called up.



Confirm query „delete“ by **Yes** or reject using **No**.

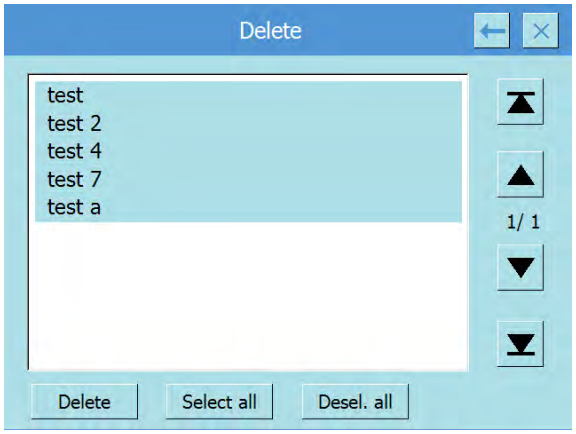
Or Selection list



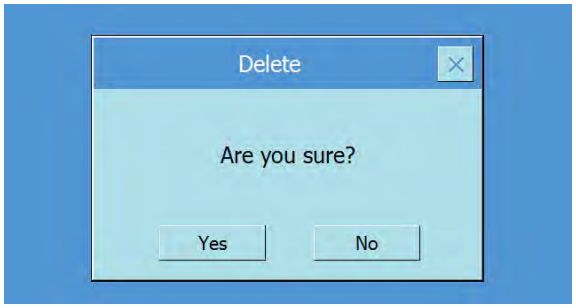
Either

Touch the memory location name in the list and touch the Delete button.

or



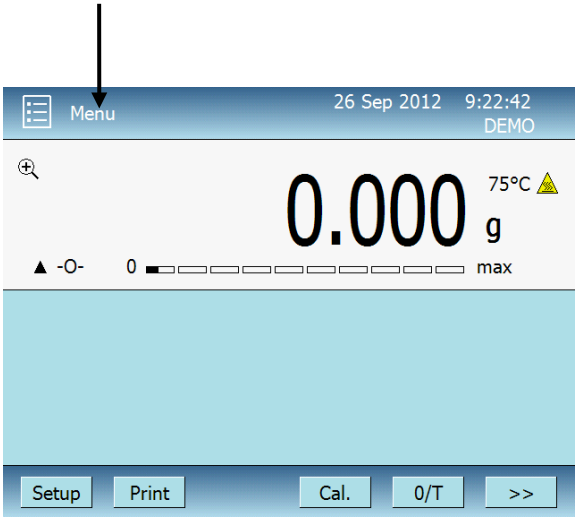
To delete the complete memory content, touch the Select all and the Delete button.



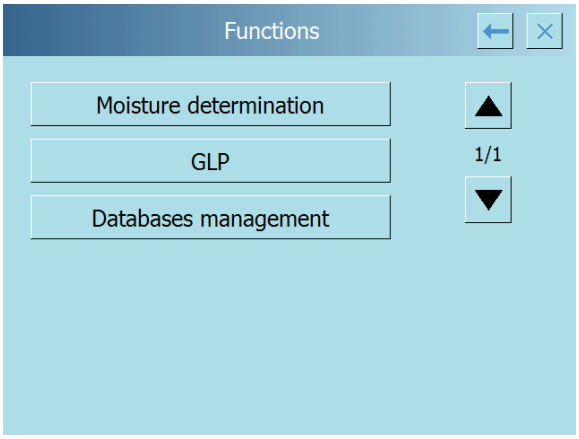
Confirm query „delete“ by Yes or reject using No.

English

13 Function menu



Tap “Menu” command button.

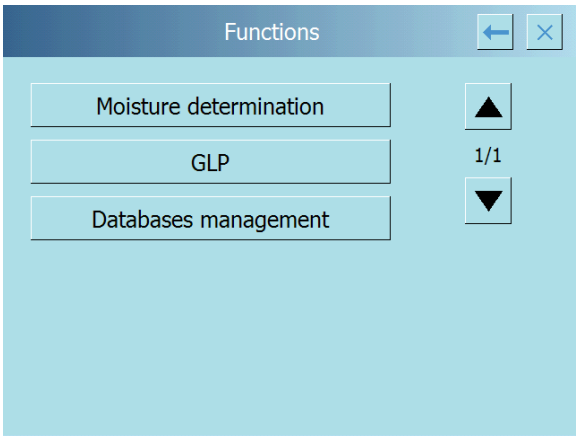


The available settings are displayed:

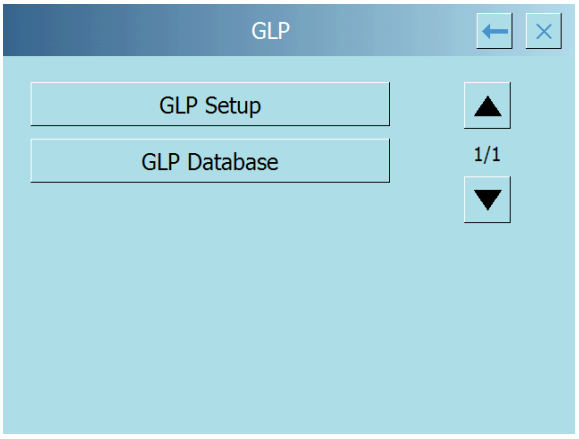
- For moisture determination, see chap. 11
- GLP, see chap. 12.1
- Database management

English

13.1 GLP



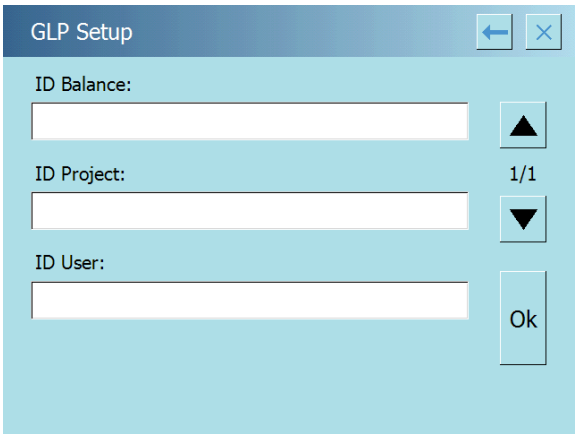
Tap command button GLP.



GLP Setup: **GLP parameters for printouts**

GLP database: **GLP user**

- **GLP Setup**



Tap command button GLP Setup and the GLP parameters will appear.

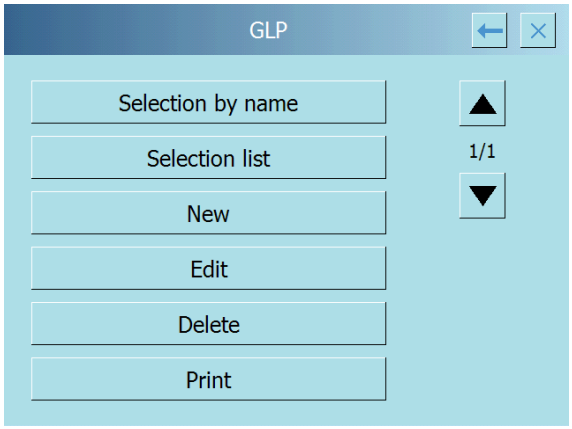
- Balance ID
- Project ID
- User ID

To enter, tap relevant white field and the entry window will appear (For entry see chap. 9.3.1)

English

- **GLP database**

Tap command button GLP Database.



This function is used to save various GLP users and to change or delete existing GLP users. For exporting and importing see chap. 12.2.

To load GLP parameters from the memory, tap command button.

Tap Selection by name

or

Selection list.

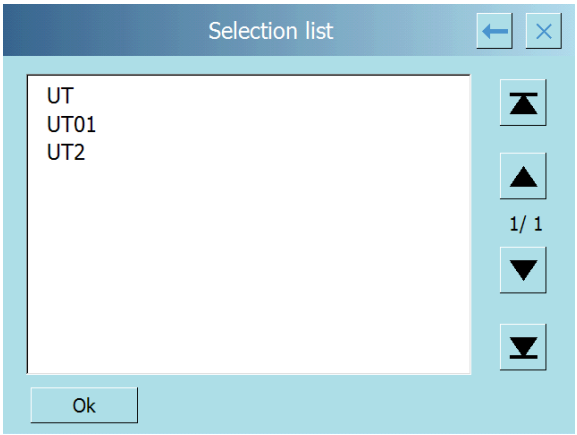
English

Either Selection by name

Enter a “GLP user name” in the entry window and confirm by Enter.

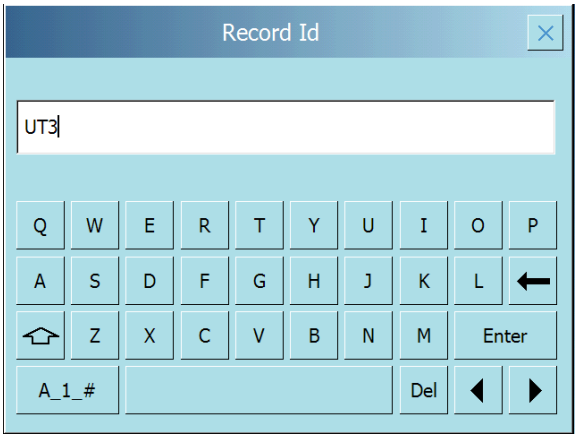
The saved GLP parameters will be shown.

Or Selection list



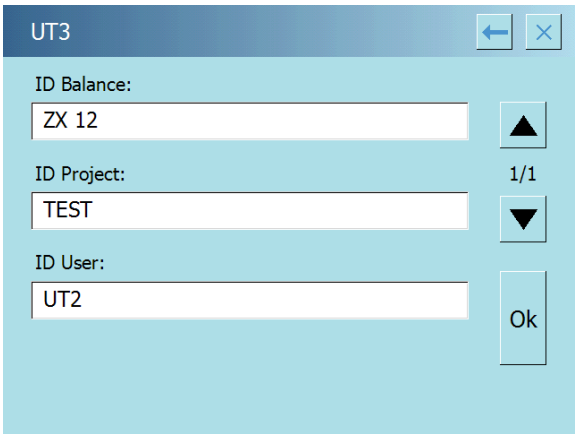
Select “GLP user name” from list and confirm by OK.

The saved GLP parameters will be shown.

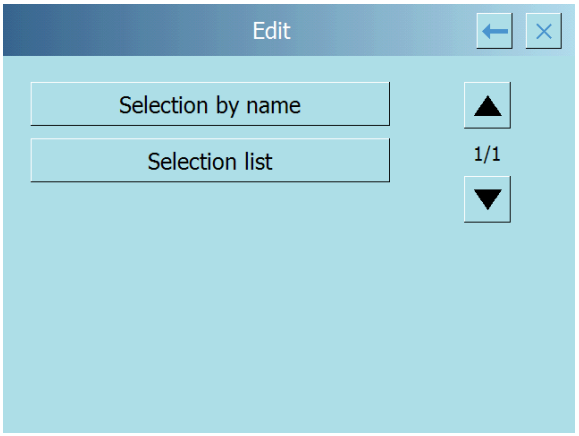


- New

You can apply this function to create different GLP users (max. 300).
Tap command button New and the entry window will appear (For entry see chap. 9.3.1). Enter user name and confirm by Enter and the display for entering GLP parameters will appear.

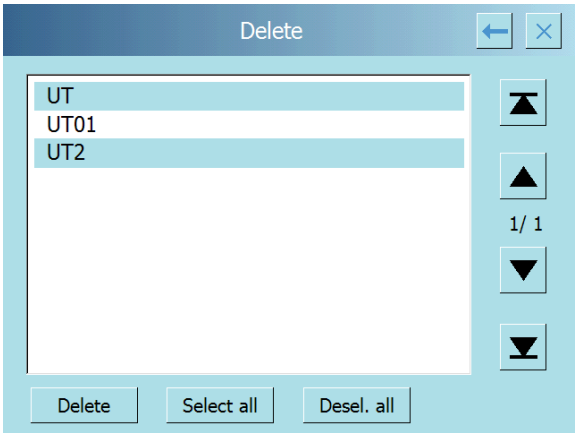


To enter (max. 20 characters) tap the relevant white field and the entry window will appear (For entry see chap. 9.3.1).
Import entry by tapping OK .



- Edit

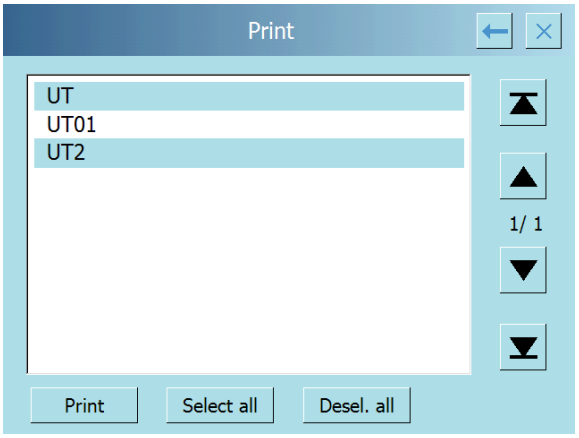
Change GLP profile



Delete

Delete GLP profile

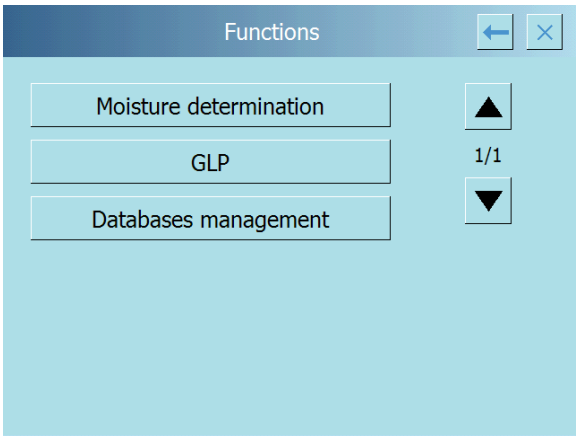
English



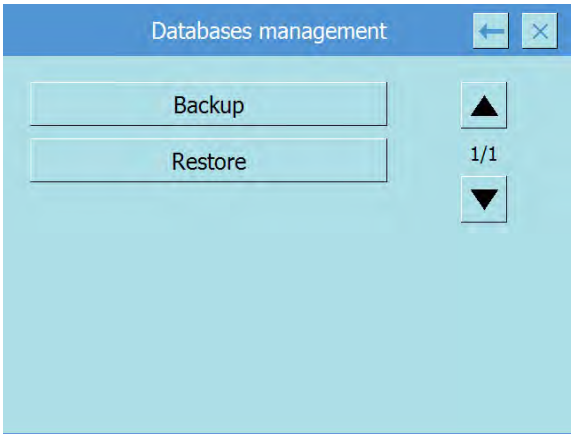
- Print

Print GLP profile

13.2 Database management



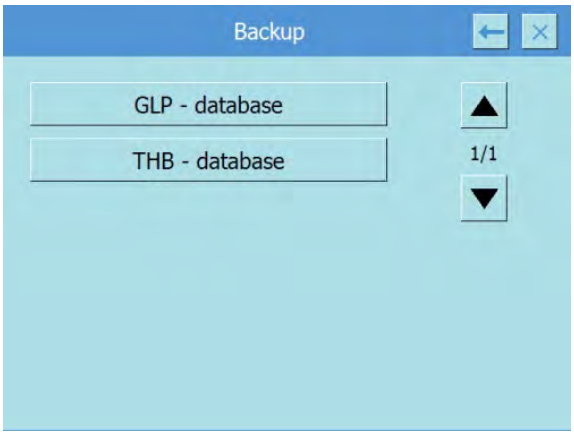
Tap command button Databases management



Tap required command button.

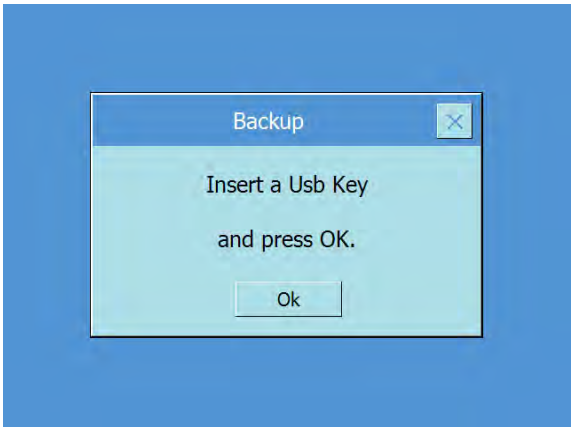
Exporting a GLP profile with the help of an USB stick is described below.

Follow the same sequence of operations for importing and follow the instructions shown on the screen.

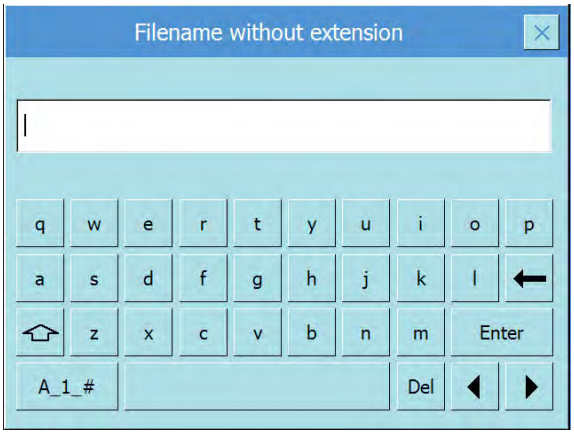


- Tap backup.

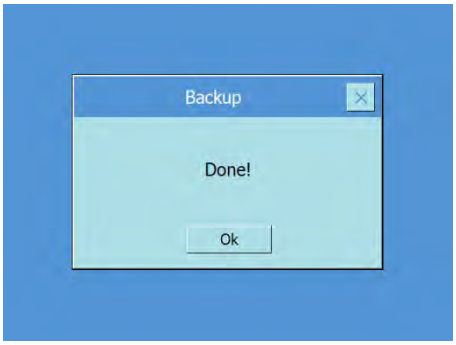
Select GLP data or measured data.



Insert USB stick and confirm by OK.



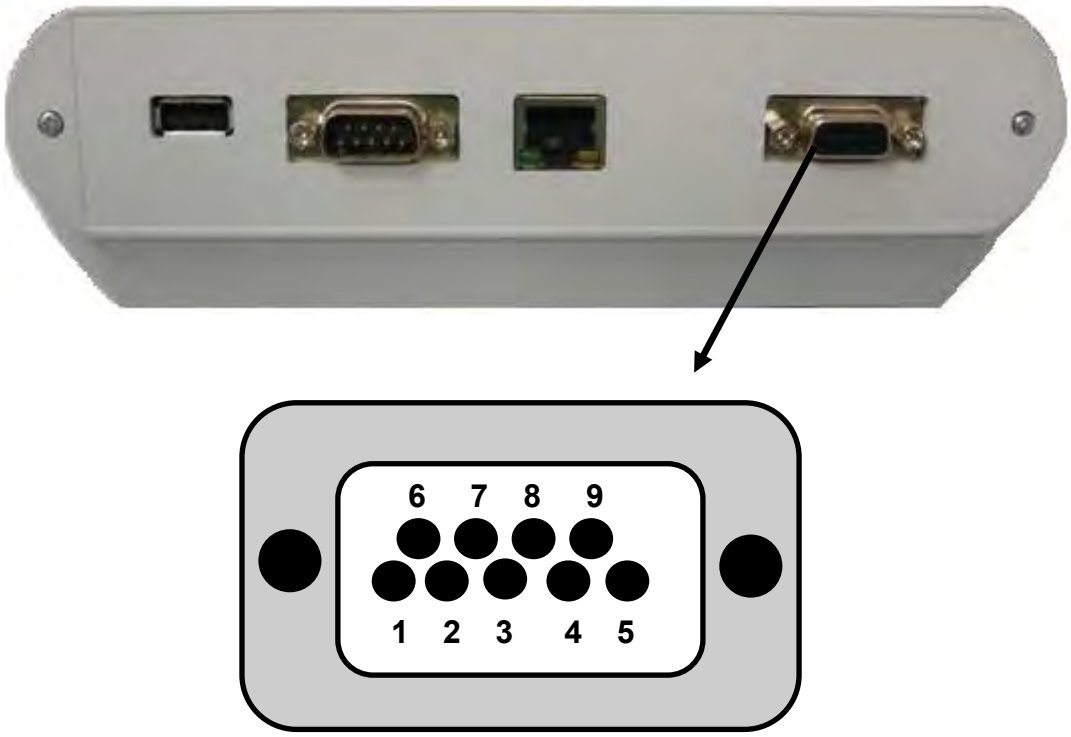
Enter “file name” in the entry window and confirm by Enter.



Data will be saved to the USB stick.

English

14 RS 232 interface



pin 2	Tx signal
pin 3	Rx signal
pin 4	busy signal
pin 5	ground
pin 4-6	connected between them for transmission to PC

15 General information concerning moisture analysis

15.1 Application

In all cases where moisture is added to or removed from products, a fast determination of the moisture content is of enormous importance. For countless products the moisture content is not only a quality feature but also an important cost factor. Very often fixed limits for moisture content apply to the trade in industrial or agricultural goods as well as chemical or food products which are defined by terms of delivery and general standards.

15.2 Basics

Moisture does not only mean water but includes all substances that evaporate when heated up. In addition to water this includes,

- Fats
- Oils
- Alcohol
- Solvents
- etc...

There are various methods to analyse moisture in a product.
KERN DLT uses a method called thermogravimetrics. In accord with this method, the sample is weighed before and after heating, determining the material moisture by looking at the difference.
The conventional drying chamber method follows the same principle, with the exception that this method requires a considerably longer measuring period. In accord with the drying chamber method, the sample is heated from the outside to the inside by a hot air current, so as to remove the moisture. The radiation applied in the KERN DLT penetrates mainly the sample in order to be transformed inside it into heat energy that is, warming from the inside to the outside. A minor amount of radiation is reflected by the sample, a reflection that is less in dark samples than in light-coloured ones. The depth of penetration of the radiation depends on the permeability of the sample. In samples of low permeability the radiation only penetrates the outer layers of the sample, possibly resulting in imperfect drying, incrustation or burning. For that reason the preparation of a sample is of great importance.

15.3 Adjustment to existing measuring method

Quite frequently the KERN DLT replaces a different drying method (such as a drying chamber) as the KERN DLT achieves shorter measuring times during a simplified operation. For that reason the conventional measuring method must be matched to the KERN DLT in order to achieve comparable results.

- Carry out parallel measurement
  Lower temperature setting for KERN DLT than drying chamber method
- Result of KERN DLT does not match reference
  - Repeat measurement with changed temperature setting
  - Vary shutoff criterion

15.4 Preparing a sample

Prepare one sample at a time for measuring. This prevents the sample from exchanging moisture with its surroundings. If several samples have to be taken at the same time, they should be packed in airtight boxes so that they do not undergo changes during storage.
To receive reproducible results, spread the sample thinly and evenly on a sample dish.
Patchy spreads will produce inhomogeneous heat distribution in the sample to be dried resulting in incomplete drying and increased measuring time. Sample clusters generate increased heating of the upper layers resulting in combustion or incrustation. The high layer thickness or possibly arising incrustation makes it impossible for the moisture to escape from the sample. Due to this residual moisture, measured results calculated in this way will not be comprehensible or reproducible.

Preparing a sample from solids:

- Spread powdery or grainy samples evenly on the sample dish.
- Grind coarse samples using a mortar or a shredder. When grinding the sample avoid any heat supply as this may cause loss of humidity.

Preparing a sample from liquids:

For liquids, pastes or melting samples we recommend to use a glass fiber filter. The glass fiber filter has the following advantages:

- even distribution thanks to capillary attraction
- no formation of droplets
- fast evaporation due to a greater surface

15.5 Sample material

Easy to determine are usually samples with the following characteristics:

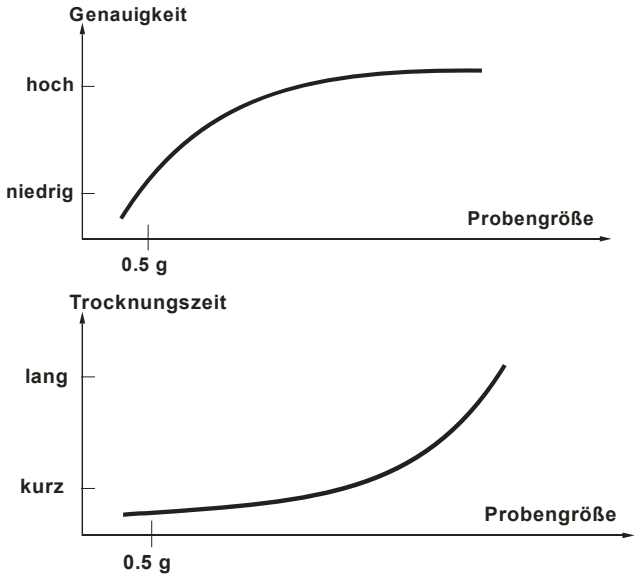
- Grainy to powdery, pourable solids
- Thermally stable materials, emitting the moisture to be determined easily without other substances evaporating at the same time
- Liquids that vaporize to leave a dry substance without developing a film

Difficult to determine may be samples that are:

- Glutinous or sticky
- Become incrusted easily or tend to form a film
- Decompose easily under the influence of heat or emit various elements

15.6 Sample size / originally weighted in quantity

Drying times, as well as achievable accuracy, are significantly influenced by sample distribution. In the course of this arise two opposed requirements:
The lighter the originally weighted in quantity, the easier it is to achieve shorter drying times.
However, the heavier the originally weighted in quantity, the more accurate a result.



English

15.7 Drying temperature

Bear in mind the following factors when setting the drying temperature:

Surface of the sample:
Compared with powdery or grainy samples, liquid and spreadable samples have a smaller surface for the transmission of heat energy.
The use of a glass fibre filter improves the heat application.

Colour of sample:
Light-coloured samples reflect more heat radiation than dark ones and therefore require a higher drying temperature.

Availability of volatile substances:
The better and faster the water or other volatile substances can be disposed, the lower a drying temperature is required. If water is difficult to get to (e. g. in synthetics), it has to be calcined at high temperatures (the higher the temperature, the higher the water vapour pressure).
Results equivalent to other moisture analysing methods (e. g. drying chamber) can be achieved by experimentally optimising the setting parameters such as temperature, heating level and shutoff criteria.

15.8 Recommendations / Guidelines

Prepare standard sample:
- Crush sample, as required, and spread it evenly in the aluminium dish.

Prepare special samples:
- For sensitive or hard to spread test materials (e. g. mercury) a glass fibre filter is available for use.
- Apply the sample equally on the glass fibre filter and cover it with a second glass fibre filter.
- The glass fibre filter is also useful as a protection when splashing materials are dealt with (each splash falsifies the final result).

Table of applications:

Material	Weight Sample (g)	Drying temperature (°C)	Drying time (approx.) (min)	Humidity % (approx.)	Solids % (approx.)
ABS (Novodur P2H-AT)	10	60	10	0.11	
Accumulator lead	10	110	2.6	0.19	
Acryl granulate	10-15	80	12	0.18	
Activated carbon	10	80	9.8	13.33	
Activated carbon	7,6	80	4.1	6.12	
Sliced pineapple	5	110	14.4	6.71	
Sliced apple (dry)	5-8	100	10-15	76.5	
Sliced apple (humid)	5-8	100	5-10	7.5	
Artesan powder	0.5	80	3.5		98.44
Aspartame granulate	0.5	105	3.4		96.84
Bath milk	3	80	27.4	83.87	
Cotton seed	3-4	110	6.3	6.8	
Blue-veined cheese	2	160	13.3		53.06
Body lotion	3	80	31.6	87.76	
Beans	4.5	150	9.7	11.85	
Butter	1.7	140	4.3		84.95
Acetyl cellulose	5.5-6	50	1.3	0.81	
Chinese Virility powder	2.5-3	110	5.5	6.24	
CN photographic paper	2	150	6.4	5.81	
Cornflakes	2-4	120	5-7	9.7	
Roof tile mass	2.5	160	10		81.74
Roof tile mass	7	160	20		81.74
Dialysis membrane (Polyethes – polycarbonate)	0.5	80	2.2	7.85	
Dialysis membrane (Polyethes – polycarbonate)	0.5-0.7	80	2.0	7.86	
Indoor sealing compound	3	160	7		64.04
Dispersion adhesive	1.5	140	9.5		55.69
Dispersion adhesive (watery)	2.5	155	7.2	43.77	
Dolomite	10-12	160	6.1	0.06	
Printer ink fluid	1.5	120	10		19.15
E-filter dust of waste incineration	7-10	135	7	26.23	
Peas, „danish yellow“	3.5	135	7.9	15.19	
Peanut cores	2.8	100	4	1.97	
Peanut cores	3	100	6	3.2	
Refreshment candies	3-3.4	90	2.9	0.29	
Dye powder	1.5	120	3.5		99.07
Fine ceramic mass	2.5	160	9		86.89
Film waste	8-9	60	1.2	0.4	
River water	4	160	20	99.2	
Fudge/sugar mass	5	130	20	8	
Formaldehyde urea dispersion	2	155	7.6	34.07	
Cottage cheese	1.4	70	15		41.03
Forage pellets	3-4	150	5.7	6.35	
Dried beans	3-4	105	5	7.3	
Dried peas	5-7	110	9.6	5.89	
Dried carrots	5.5-6	120	3	4.92	
Dried chicken dung	4	140	8	14.81	
Dried corn	5-7	110	10	6.21	
Glass powder	8-10	160	5	0.26	

Material	Weight Sample (g)	Drying temperature (°C)	Drying time (approx.) (min)	Humidity % (approx.)	Solids % (approx.)
Setting lotion	0.01	145	9	98.76	
Setting lotion (extra strong)	1	130	8	97.85	
Hair styling gel	5	105	37.0	94.71	
Oat flakes	2	105	5.6	9.35	
Hazelnut cores	2.2	100	3.8	4	
Hazelnut cores (peeled)	2.6	100	4.5	3.74	
Hydranal sodium tatrate – 2 – hydrate	1.6	160	12	15.67	
Yoghurt	2-3	110	4.5-6.5	86.5	
Coffee	2	150	8	4.99	
Coffee cream	2-3	130	6-8	78.5	
Coffee seed	3.5-4	120	8	8.53	
Cocoa	2.5	105	4	3.45	
Cocoa seed	4-5	130	7.8	6.23	
Limestone	12-14	160	5	0.05	
Potato powder	2.5-3.0	130	5.8	12.46	
Potato chips	3-4	106	7.5	6.9	
Ketchup	2	120	18	74.44	
Silica gel	9.5	115	4.5	0.63	
Adhesive	2-5	136	6-8	54.3	
Garlic, powder	2	100	7.3	5.36	
Coal powder	4	160	3.4	2.11	
Chalk (natural)	8	160	1.7	0.06	
Crystal sugar	3	90	2.8	0.05	
Synthetic resin dispersion (diluted)	2	160	5.9	60.21	
Latex	1-2	160	5.2	38.64	
Latex LE1	3-5	125	10.8	46.58	
Latex LE[2]	3-5	125	9.4	50.37	
Latex O44	3-5	125	9.4	50.65	
Lentils	4	135	5.4	12.49	
Loam soil	10-15	160	5.5	9.89	
Loam clay	2.5	160	14.5		80.75
Skim milk powder	4	90	5.5	3.67	
Low fat curd cheese	1.2	130	8		18.5
Corn starch	2	160	5.2		89.1
Almonds (caramelised)	3.5	80	4.8	1.81	
Almonds (natural)	2.5	100	5.3	4.19	
Almonds „californian“	3	100	5.3	4.34	
Margarine	2.2	160	4	19.15	
Brick mass	7	160	20		80.13
Mayonnaise	1-2	138	10	56.5	
Flour	8-10	130	4.5	12.5	
Micronyle	7-8	60	8	0.4	
Milk	2-3	120	6-8	88	
Milk powder (MMP)	4.5	100	6.3	2.46	
Milk powder (VMP)	4.5	100	5.5	2.56	
Mozzarella	1.5	160	11.1		45.78
Multivitamin candies	3-3.4	115	3.3	0.4	
Natural latex	1.4	160	5.3	42.56	
Nougat mass	2.5	103	10	0.6	
Noodle dough	0.55	160	5	12	
Concentrated orange juice	2-3	115	13	52.1	

Material	Weight Sample (g)	Drying temperature (°C)	Drying period (approx.) (min)	Moisture keit % (approx.)	Solids körper % (approx .)
Paper	2-4	106	10	6.4	
PA 6 (Ultramide B3WG5)	10	60	10	0.05	
PA 6.6 (Ultramide B3WG5)	10	80	10	0.15	
PBTP (Crastin SK645FR)	10	80	10	0.05	
PC (Macrolon 2805)	10-12	80	15	0.08	
PC/ABS (Babyblend T65MN)	9-11	80	10	0.12	
Pepper, black, powder	2	85	8.8	7.97	
PMMA (Plexiglass 6N)	10	70	10	0.12	
Polypropylene	13	130	9	0.23	
Polypropylene	3.3	120	2.2	0.09	
Polystyrene sulfonic acid Sodium salt solution	2-2.5	120	8.7	19.01	
POM (Hostaform C9021))	10	80	10	0.13	
PS (Polystyrene 168 N)	10	80	10	0.05	
Purine	2	105	3.8	8.64	
Curd	1	140	7		18
Curd cheese, „Fat curd cheese“	1.2	130	8		23
Silica sand	10-14	160	1.9	0.24	
Raclette cheese	1.5	160	14.4		56.9
Canola seed	3-4	90	7.4	6.18	
Rice (US parboiled)	3.5	105	12.5	10.98	
Rye	4.5	150	11.5	10.72	
Red wine	3-5	100	15-20	97.4	
Sugar beet pulp pellets	4.5	150	8.6	11.77	
Salt	2	100	3	4.9	
Pretzel sticks	3-4	75	4.5	1.67	
Sludge	11-12	130	90	80	
Melted cheese	1.5	70	15	35.65	
Chocolate	2.5	103	10	0.5	
Chocolate powder	2-4	100	4	1.9	
Chocolate water	2-3	90	10		6
Hogwash of kitchen waste	4-5	160	21		17.67
Lard	0.70	160	3.5	1.2	
Shampoo	2	100	14.1	75.89	
Soap	3	120	6	7.86	
Mustard	2.5-3	80	19		34.69
Sesame seed	3	130	8	5.48	
Soya bean flour	4.6	95	4.9	4.8	
Soya beans, granulate	5	110	22.6	12.16	
Bruised sunflower seed	3-3.5	100	4	5.92	
Sunflower oil	10-14	138	2	0.1	
Spaghetti	3	105	15.1	10.63	
Rinsing agent	2	80	13.7	59.64	
Dust	5-10	104	8-15	7.3	
Starch derivative	2.5	150	12.3		30.29
Starch glue	1.5	100	8.9		17.96
Spread cheese	2.5-2.8	160	4.5		36.81
Soup (instant product)	2-3	80	4.5-7	3	

Material	Weight Sample (g)	Drying temperature (°C)	Drying period (approx.) (min)	Moisture keit % (approx.)	Solids körper % (approx.)
Tobacco	1.5	100	16	10.18	
Tea, black	2	105	4	7.67	
Pasta	1.5	120	8	10.64	
Textile fibre	0.8-1.2	85	3.6	14.03	
Theophylline	1.5	130	1.9	7.33	
Thermoplastic PUR – granulate	15-18	80	18	0.08	
Walnut	2.8	100	5.6	3.5	
Washing powder	2	160	12	7.32	
Wheat spring water	2-3	90	10		6
Sausage casing	0.2	150	3.5		78.56
Toothpaste	2	100	7.7	34.28	
Pulp	2.5	130	4.5	7.32	
Cement	8-12	138	4-5	0.8	
Sugar	4-5	138	10	11.9	
Sugar beets	2	130	13.4		30.94

16 Service, maintenance, disposal

16.1 Clean

☞ Before any maintenance, cleaning and repair work disconnect the appliance from the operating voltage.

☞ Wait for the instrument to cool down before cleaning.

1. Display	Please do not use aggressive cleaning agents (solvents or similar agents), but a cloth dampened with mild soap suds.
2. Wind protection ring	Remove wind protection ring / sample dish, wet clean and dry thoroughly before fitting
3. Sample dish	
4. Housing	Please do not use aggressive cleaning agents (solvents or similar agents), but a cloth dampened with mild soap suds. Take care that the instrument is not penetrated by fluids and polish it with a dry soft cloth. Loose residue sample/powder can be removed carefully with a brush or manual vacuum cleaner. **Remove any spilt sample material immediately.**

16.2 Service, maintenance

⇨ The instrument may only be opened by trained service technicians who are authorized by KERN.

⇨ Ensure that the integrated balance is regularly calibrated, see chap. Testing instruments control.

16.3 Disposal

⇨ Disposal of packaging and instrument must be carried out by operator according to valid national or regional law of the location where the appliance is used.

17 Instant help

Fault	Possible cause
Display is not lit up.	• Please switch your instrument on. • The mains supply connection has been interrupted (mains cable not plugged in/faulty). • Power supply interrupted.
The display does not change when a sample is being loaded	• Sample dish / dish holder is fitted incorrectly.
The weight display changes constantly / the stability display does not appear.	• Sample dish has contact with wind protection device or heated cover. • Draught/air movement • Table/floor vibrations • Electromagnetic fields / static charging (choose different location/switch off interfering instrument if possible)
Incorrect measuring result	• Check adjustment • No resetting to zero before loading the sample
Measurement is taking too long	• Incorrect setting shutoff criterion
Measurement is not reproducible	• Sample is not homogenous • Drying time is too short • Drying temperature too high (e.g. oxidation sample material, boiling point of sample exceeded) • Temperature sensor soiled or defective
Drying does not start	• Heated cover open • The mains supply connection has been interrupted (mains cable not plugged in/faulty).

18 Declaration of Conformity

KERN & Sohn GmbH

Declaration of Conformity

EC-Konformitätserklärung
EC Déclaration de conformité
EC Dichiarazione di conformità
EC Declaração de conformidade
EC Deklaracja zgodności

EC Declaration of -Conformity
EC Declaración de Conformidad
EC-Conformiteitverklaring
EC Prohlášení o shode
EC Заявление о соответствии

D	Konformitäts-erklärung	Wir erklären hiermit, dass das Produkt, auf das sich diese Erklärung bezieht, mit den nachstehenden Normen übereinstimmt.
GB	Declaration of conformity	We hereby declare that the product to which this declaration refers conforms with the following standards.
CZ	Prohlášení o shode	Tímto prohlašujeme, že výrobek, kterého se toto prohlášení týká, je v souladu s níže uvedenými normami.
E	Declaración de conformidad	Manifestamos en la presente que el producto al que se refiere esta declaración está de acuerdo con las normas siguientes
F	Déclaration de conformité	Nous déclarons avec cela responsabilité que le produit, auquel se rapporte la présente déclaration, est conforme aux normes citées ci-après.
I	Dichiarazione di conformità	Dichiariamo con ciò che il prodotto al quale la presente dichiarazione si riferisce è conforme alle norme di seguito citate.
NL	Conformiteit-verklaring	Wij verklaren hiermede dat het product, waarop deze verklaring betrekking heeft, met de hierna vermelde normen overeenstemt.
P	Declaração de conformidade	Declaramos por meio da presente que o produto no qual se refere esta declaração, corresponde às normas seguintes.
PL	Deklaracja zgodności	Niniejszym oświadczamy, że produkt, którego niniejsze oświadczenie dotyczy, jest zgodny z poniższymi normami.
RUS	Заявление о соответствии	Мы заявляем, что продукт, к которому относится данная декларация, соответствует перечисленным ниже нормам.

Electronic Balance: KERN DLT

EU Directive	**Standards**
2004/108/EC	EN 61326-1 (2006)
2006/95/EC	EN 61010-1 (2001)

Datum
Date **12.12.2012**

Signatur
Signature

Albert Sauter
KERN & Sohn GmbH
Geschäftsführer
Managing director

English